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THE GAS JOURNAL

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A Glance at the Contents—

Wales and Monmouthshire Juniors.

The Presidential Address of Mr. C. H. Collins, of Swansea, to the Wales and Monmouthshire Junior Gas Association is published.

Calorimetry.

Mr. W. H. B. Hall describes the apparatus used by the South Metropolitan Gas Company to satisfy the conditions of the Gas Referees' Notification. It is a device for heating the water supplied to a Boys calorimeter.

London Juniors Visit Refractory Works.

An account is published of the visit, on Wednesday, Nov. 5, of the London and Southern District Junior Gas Association to the works of the Stourbridge Refractories Company, Ltd., at Pensnett, near Dudley, under the Presidency of Mr. T. H. Prater, of Margate.

The Correlation of Coal Seams.

An interesting review of a new Department of Scientific and Industrial Research publication appears to-day. This is "The Significance of Spores in the Correlation of Coal Seams. Part I. The Parkgate Seam—S. Yorks. Area," by Dr. L. Slater, Marjorie M. Evans, and Gladys E. Eddy.

Electricity on Gas-Works.

On a later page to-day, Mr. E. G. Stewart, M.Inst.Gas E., of the Gas Light and Coke Company, reviews a new book by H. C. Widlake, A.M.I.E.E., Assoc.M.Inst.Gas E., entitled "Electricity on Gas-Works," published by Walter King, Ltd., "GAS JOURNAL" Offices, 11, Bolt Court, Fleet Street, E.C.4; price £1 1s. net.

A New "Practical Guide to Investment."

A short notice appears in our news columns to-day of a comprehensive guide reviewing the whole subject of investment and indicating which classes of stocks and shares are the most dependable, and for what reasons. The author is F. W. H. Caudwell, B.A.; and it is published by Effingham Wilson, 16, Copthall Avenue, London, E.C., at the price of 7s. 6d. net.

Our "Service" Page.

This week's "Service" columns contain many items of topical interest to the service side of the industry. Mention is made of a slot machine for gas mantles introduced by the South Metropolitan Company, details of Burnley's method of selling gas for steam raising, cookery demonstrations at Bristol, and the use of gas in the model village of Thorpeness in Suffolk, together with other matters of general interest.

Electrical Fusion of Gas Pipes.

At a meeting of the Midland Association of Gas Engineers and Managers, Mr. H. C. Widlake, of the Plymouth and Stonehouse Gas Light and Coke Company, delivered a lecture on this subject. He said there was no doubt that, under certain conditions, the dual use of gas and electricity by the same household might result in the creation of a dangerous state of affairs, and it was equally certain that, if gasfitters were trained to identify those conditions, much would be done to eliminate the risk of fire.

Mainlaying.

Mr. Stanley Grime, of Bolton, deals with this subject, and refers particularly to the methods employed in his own town.

Income Tax Case at Alloa.

An important principle is involved in a claim by the Alloa Gas Department for deduction of sums paid from profits for electricity losses, in computing valuation for income-tax; and we therefore summarize on a later page to-day the main facts of the case, which has its origin in a condition of affairs that has from time to time been criticized in the pages of the "JOURNAL." The appeal to the Special Commissioners having been decided against the Town Council, the matter is being taken to the Court of Session.

Mossley Adopts a "Gas Unit."

The Mossley Corporation Gas Department propose to increase their declared standard of quality from 500 B.Th.U. per c.ft. to 511·8 B.Th.U. per c.ft. They also propose to adopt a gas unit of 3412 B.Th.U. Thus 1000 c.ft. of Mossley gas at 511·8 B.Th.U. per c.ft. will equal 150 units. We give to-day a table of the proposed prices for gaseous energy. These scales are *not* subject to any consumers' power factor, or to any coal clause; no meter rent is charged, and there are no minimum charges of any description.

Paisley's New Showrooms.

"Keep your eye on Paisley" was a famous politician's utterance that is often quoted to-day. The recent opening of new Gas Showrooms in the town of thread and cotton gives the inhabitants the opportunity of keeping their eyes on what the Gas Department has to offer in the latest appliances for cooking, heating, and lighting. Situated in Moss Street, near County Square, the new Showrooms are right in the heart of the shopping centre of the town, and make a notable addition to the many fine premises in the vicinity.

Hastings and St. Leonards Science Exhibition.

There has just been held at the White Rock Pavilion at Hastings an excellently organized and run Science Exhibition. The exhibit of the Gas Company consisted of a fine display illustrating the progress of gas lighting from early times to the invention of the Welsbach mantle. Although there is no public lighting in the town (it is all carried out from the Corporation's electric mains) there was a good exhibit of gas lamps for street lighting; also an example of high-pressure lighting with compressor actuated by an electric motor.

British Road Tar Association.

In his Presidential Address at the third annual meeting of the British Road Tar Association, Sir David Milne-Watson said that on Jan. 1 of this year, after protracted consideration and negotiation, Specifications for Tars Nos. 1 and 2 were issued as the official British Standards. "This marked a consolidation of the progress which had been made over a number of years; but even before these Standard Specifications were issued, our experts were engaged upon drafting a Specification for a No. 3 Tar, and this draft is now receiving the consideration of the British Engineering Standards Association. The practical utility of this No. 3 Tar is that it will facilitate quick setting, and so better enable the industry to meet continuous traffic conditions."

EDITORIAL NOTES

Alloa !—Further Developments

IN the "JOURNAL" for Aug. 12, 1919 (pp. 331 and 349) we had occasion to comment rather severely on the compulsory financial assistance afforded to the Paisley Electricity Undertaking by the Municipal Gas Department; while in our editorial columns for Sept. 26, 1923 (p. 920), and Oct. 24, 1923 (pp. 245-7), we criticized the flagrant injustice imposed on the Alloa Gas Undertaking in almost identical circumstances.

The principle involved is one of great importance to the gas industry, for the reason that, by virtue of legislation peculiar to Scotland, any losses incurred by the Electricity Department of a local authority may fall to be liquidated by the Gas Department, without any corresponding recourse to the funds of its competitor for a like purpose under reversed conditions. The inequity of this provision in the Schedule to the Electric Lighting (Scotland) Act, 1890, is all too clear, and the effect of invoking financial assistance—which the Legislature intended only to endure as long as the electric supply industry was in its infancy—all too costly to gas undertakings to be easily forgotten. For not only are gas consumers (outside as well as within the area of the local authority, be it remembered) penalized—in the case of Alloa to the extent of 7d. per 1000 c.ft.—but the suspicion is fostered that the industry is employing its assumed monopolistic powers to charge more for the supply of gas than is necessary to meet working expenses and provide reasonable profits. Further, it may even lead to an unfavourable comparison regarding the respective capabilities of the managements responsible for the competing departments—especially when, as we believe to be the case, the Electricity Department of the Alloa Town Council offered discounts ranging up to 15 p.ct. in certain instances. It is our opinion that the assistance intended by the Act of 1890 was not meant to prejudice the gas interests in this way, nor to encourage electricity undertakings to charge an uneconomic price for their commodity and embark on schemes well knowing that any loss will be made good, not by their consumers, but by the gas consumers.

This position is, as we have said on several occasions, much to be deplored; and it is gratifying to note that the unfair situation in which municipal gas undertakings find themselves will be the subject of consideration by the central body when voicing the claims of the industry for new gas legislation. The Alloa case should afford a striking example of the evil existing in present-day legislation; for it clearly shows that, but for this liability, the gas undertaking would have been able to eliminate their accumulated deficit of £4728 and reduce the price of gas over the past six years by a total of nearly £26,000—an advertisement to which the Department is surely entitled, besides conveying a good impression generally.

What concerns us more at this particular juncture, however, is the consequential liability of the gas undertaking to income-tax in respect of the income received as a result of the additional charge levied in those years for the purpose of, and applied in aid of, the electricity deficit. That it was realized that the heavy burden placed upon the Gas Department would in all probability be increased, due to the tax payable thereon, is evident from the remarks of the Convener of Alloa (Bailie Hendry) as recorded in the "JOURNAL" for July 23, 1924 (p. 375).

While the principle involved in the financial aspect has but a limited application, it is suggested that the result of the forthcoming income-tax appeal of the Alloa Town Council from the decision of the Special Commissioners will affect all municipal trading departments which, under the 1890 or any other Act, compulsorily—or perhaps even voluntarily—give financial assistance to other departments of the local authority. For this reason, the case as presented to the Special Commissioners has been examined and summarized in an article appearing on another page of this issue. We would express the view that the Alloa Town Council have rendered a signal service to the industry in contesting this appeal, and venture to hope that the decision of the Court of Session will be such as not to inflict further burdens on undertakings which already suffer adversely in comparison with electric supply undertakings. As the establishment of the principle for which application is now being made involves a sum probably exceeding £10,000, the magnitude of the question may well be appreciated.

In the Cause of Tar

SOME idea of the importance of the British tar industry can be gathered when it is considered that, quite apart from its influence on other allied industries, it directly employs nearly 200,000 workpeople in gas, coke-oven, and tar distilling works, and indirectly gives work to 800,000 miners. The influence of the tar industry is, of course, even wider than this, for it leaves its mark on the price of gas, and directly affects the cost of producing iron and steel. These facts, and many others of an equally forceful nature, were brought out by Sir David Milne-Watson in his address as President to the Third Annual Meeting of the British Road Tar Association. On that occasion, Mr. Reginald G. Clarry, who was some time ago appointed Chairman of the Managing Council, remarked that it would be difficult to imagine the Association without the President; and with this expression of opinion there will be general agreement, as well as with Mr. Clarry's further statement that such success as has come to the Association has been very largely due to Sir David's guiding influence. An organization such as the British Road Tar Association affords plenty of scope for the qualities which the President possesses in abundance. His appetite for hard work can be satisfied by it, and there is opportunity for the exercise of patience, perseverance, and persuasion. Did not one from past experience know it to be the case, it would seem strange that so many good qualities should be necessary for the task in hand—which is no more than to induce British people to use an all-British product.

One direction in which the Association have been active is in urging upon the Ministry of Transport the desirability of their allowing the Association to conduct an official experiment under their auspices to demonstrate the traffic-bearing capacity and non-skid nature of a properly constructed tarmacadam road; and at last two stretches of tarmacadam (one of slag and one of granite) have been laid on the Kingston By-Pass, under the auspices of the Ministry. Each stretch is a substantial one, and there is every reason to anticipate a successful outcome of the experiment. More especially is this the case when it is realized that a tarmacadam surfacing of a similar nature laid on the Balham High Road by the Association two and a half years ago, when replaced by a further experimental stretch early this year had carried successfully twenty million tons of traffic. Then there are the forty and more trial lengths laid in Sheffield this year by members of the Association, with specially prepared and blended tars. Of these trial lengths, the City Surveyor and Engineer has already reported that, so far as can be judged from the summer's experience, some of these special tars are much superior to the ordinary standards.

While on the subject of specially prepared tars, mention may be made of the fact, which was stated by the President in his address, that the Association's technical experts have been engaged upon drafting a Specification for a No. 3 Tar, and that this draft is now receiving the consideration of the British Engineering Standards Association. The real aim of this Specification is to facilitate quick setting, and so better enable the industry to meet continuous traffic conditions. Work is also in progress on the preparation of General Directions and Specifications for the Construction and Maintenance of Roads with Tar. Here are proofs, and to spare, of an active life.

The Education of Gas Salesmen

We dealt last week in general terms with the paper read at Hull by Sir Francis Goodenough on the proposed scheme of the B.C.G.A. for the education of the gas salesman, and we return to the subject for the purpose of considering it a little more in detail, though it still remains for full particulars to be published after the consultations have taken place which Sir Francis foreshadowed with representatives of both the salesmen and the teachers of Gas Supply subjects.

The paper read by the Chairman of the Executive dealt, and rightly dealt, with the whole subject so comprehensively that it may be useful to extract from it the points which relate to that side of the scheme which is essentially new and deals with Training in the Science and Art of Selling. As Sir Francis pointed out, in the education of its commercial staff the industry as an organized body—as distinct from individual undertakings with schemes of their own—has not hitherto gone beyond providing the Institution Scheme for teaching the technics of Gas Supply, and organizing the Salesmen's Circles for discussing selling problems. The new scheme does two very necessary things. First, it provides for such modification of the Gas Supply Courses as will make them more useful to the salesman without diminishing their value to the technician. To quote from Sir Francis: "The Executive propose . . . that there should be a modification, not of the Syllabus of the Gas Supply Course, but of the stress laid, alike by the teachers and the examiners, upon the more technical side of Gas Supply, so that less attention be paid than now to the details of the work of the distributing engineer . . . and so that the whole subject should be dealt with more from the historical and commercial viewpoint than from the strictly technical. It is also proposed . . . that to the Syllabus of Gas Supply in both grades there should be added a section dealing with the 'Economics of Gas Supply.' This would cover the history of the industry, the statutes governing its operations, and especially its relations with consumers, including powers of charge, and the relation of the industry to smoke abatement, public health, coal conservation, and other national problems." Further, the new scheme provides, for those who are either too old to undertake a full technical-commercial Gas Supply Course, or are unable to benefit by such a course, or whose employment does not permit of or call for the taking of such a course, an alternative, less technical, Gas Sales Commercial Practice Course to include elementary instruction in both the Technics and the Economics of Gas Supply.

In the second place, the new scheme, having made provision for the education of the Salesman in his Industry and in his Commodity, proceeds to supply "a thorough plan and organization for teaching the individual how to make use of his general and technical knowledge in the actual business of securing orders or maintaining the goodwill of present customers; in brief, *how to sell.*" As Sir Francis truly says. "An employee completely equipped with scientific knowledge and technical skill, with general information respecting the history and policy of the industry, and with accurate statistics as to the relative costs of gas and electricity, is useless as a Salesman unless he knows how to use these tools on the job—the job of pleasing and persuading the customer."

That is the great value, as we see it, of the scheme outlined at Hull and now being put into final shape, that it provides at last what managers and salesmen alike have been looking for—organized means for teaching the individual salesman the right (and wrong) arguments on behalf of every possible use of gas by every class of consumer, and the right (and wrong) way of presenting these arguments; how to meet arguments and prejudices against gas; and how to deal with every aspect of gas service to every class of customer, including the handling of correspondence, disputed accounts, complaints, and other possible disagreements between undertaking and customer—all directed to the end of securing the maximum amount of permanent business.

The outline given by Sir Francis Goodenough and by Mr. Whitehead of the way it is proposed to prepare such a scheme and to put it into operation strikes us as very sound. The essential basis is the knowledge and experience of the most competent salesmen in the industry, *plus* the observation of trained observers and their analysis of the whole selling problem, all welded into a selling plan set forth in text-books for home study and manuals for the direction of group discussion and experiment.

The Salesmen's Circles, in which the "Journal" has taken a lively and, we hope, a helpful interest from their inception, will have an added value and a new purpose in getting the new scheme into operation and making it fully fruitful for every one of their members. The sooner the B.C.G.A. can get the scheme launched, the better for every salesman and every undertaking in the industry that is ready to seize and make full use of what we are confident will prove a great opportunity.

Concentrated Service

On several occasions we have emphasized in these columns the value of keeping in the closest possible touch with architects and builders. Several of the larger gas undertakings in this country have special departments to cope with this work, but we have yet to hear of one or two concerns combining in order to enjoy the benefits of such a service. For this reason we were very interested to hear that in the United States recently three gas companies together formed an architects' and builders' department which represents all three concerns. The results of this move were dealt with by Mr. Raymond Little, of the Equitable Gas Company, Pittsburgh, at the annual convention of the American Gas Association last month; and they well indicate the virtues of co-operation of this nature. Mr. Little is Chairman of the A.G.A. Architects' and Builders' Service Committee; and his conviction of the success which attends concentrated organization in this direction is well worth noting. The service rendered deals with the sizes and arrangements of services, meters, points, and so on, as well as current regulations governing the efficient utilization of gas in modern dwellings. "Give the architect, engineer, and builder this service," says Mr. Little, "assist him to lay out gas piping plans, and a proper and increased utilization of gas as a fuel will follow as a natural course of events."

The A.G.A. Committee have done excellent work by co-ordinating the efforts of individual companies; and it seems that the near future will see marked developments in this particular service activity. Mr. Little cites the results of several undertakings—some large, some small—who have paid due attention to architects and builders. In one instance, the results of such activity in 1927 showed that 2923 gas points were placed in buildings which originally carried no plans for them; the figures for 1928 and 1929 are 2492 and 3321 respectively—again in buildings where no gas point was specified. Moreover, the carcassing is to specification, with consequent satisfaction of the consumer. Regarding this instance, Mr. Little says: "The relations between this gas company and the building trade are so successful that those in the new building field invariably call the gas company in on the plans for new buildings. This, of course, gives the gas company a decided advantage over competing fuels." The service, too, is gradually eliminating the same type of difficulties which are encountered in Great Britain today—under-piping of premises, in order to cut down costs, and inadequate flue arrangements.

The effect of an architects' and builders' service is felt by every department of a gas undertaking; and it is difficult to assess accurately the results which accrue. But it is a fact that those undertakings who have adopted it show very different results from those who are not yet so aggressively sales-minded. Again turning to Mr. Little, we quote the following: "A gas-heated home containing 5000 sq. ft. of water radiation, a gas-heated garage containing 7500 sq. ft. of steam radiation, and a gas-heated office building with 8600 sq. ft. of steam radiation, are indicative of the heating equipment sales being influenced by this activity." In another instance, relating solely to the domestic sphere: "It is estimated that 20 p.ct. of homes built since 1927 are being heated with automatic gas-fired boilers. Ninety p.ct. of homes actually planned by architects have had gas-heating specified."

We have long believed in this concentration of sales effort. A further interesting example of its efficacy was

given by Mr. H. J. Nachman, of the Washington Gas Light Company, in a recent issue of the "Gas Age-Record." He states as a foregone conclusion that the existence of a separate refrigeration department is both economical and satisfactory; and he describes in detail how his Company are dealing with the refrigeration load. Without entering into this detail here, we may mention that there are now 2110 installations of gas-operated refrigerators in the Company's area, and that, since the concentrated service was adopted, the cost of this service has been reduced by 35 p.ct. There is no doubt about it, concentration pays.

Distribution Practice

We are glad that increasing attention is being paid to the discussion of distribution problems by our Junior Associations; appreciation of the importance of the distribution side and its correlation with the manufacture of gas renders this tendency inevitable. At the last meeting of the Wales and Monmouthshire Junior Gas Association, the President, Mr. C. H. Collins, of Swansea, dealt solely with sales questions, while at a meeting of the Manchester and District Junior Gas Association on Wednesday last Mr. Stanley Grime, of Bolton, read a paper on main-laying, referring particularly to the methods adopted by his own undertaking. Reports of both these meetings are published on later pages of our issue to-day, and both contributions are essentially "practical."

The remarks of Mr. Collins on the matter of gas lighting indicate how necessary it is to foster amicable relationship with architects and builders, as we have emphasized in the foregoing article, and how valuable is a special lighting service. There is no doubt that service plays a considerable part in the retention of existing lighting consumers; and maintenance schemes, policies of replacing obsolete fittings free of cost, and the supply of burners and mantles at cost price, contribute to the retention of the lighting load. Gas switches, now available at marketable prices, enable us to claim that convenience of operation which the public demands. Regarding this lighting service, our readers will be interested to learn of the latest idea of the South Metropolitan Gas Company. Slot machines for gas mantles are being installed at various places in South London. Should a mantle become broken, all a customer has to do is to put sixpence in the slot for a new "Metro" mantle of standard quality. More than thirty machines have been installed already in large blocks of flats, outside shops, and at other convenient positions; and before long it is hoped that they will be fixed also at all railway stations throughout the Company's area.

Mr. Collins gives many useful tips in regard to the cooking and water heating load. As for the former, he believes that over half the cooker complaints arise because the consumer does not keep the cooker clean; and this points to the value of women demonstrators—a system which has been adopted with great success by many of the larger undertakings. On the question of water heating by the geyser, Mr. Collins maintains with every justification that accidents and complaints are due to faulty fitting. In this connection, however, he does not stress the importance of watching the maximum consumption. The "maximum consumption" matters more than any other single factor which influences the functioning of the geyser. The whole of Mr. Collins' address indicates the need for good service and sound salesmanship—and the latter should not be confined to those occupying positions in the showrooms. Abundant opportunities present themselves to most employees of a gas company to introduce the question of gas appliances in proper circumstances. In particular, fitters, collectors, and inspectors have special opportunities of introducing new business to consumers in the ordinary course of their work; and they have unique opportunities of maintaining a pleasant relationship between the consumers and the gas undertaking.

Of particular interest in the paper by Mr. Grime is his description of Bolton's method of dealing with escapes—a service which is continuous, night and day. Promptitude is the essence of this service; but with every precaution it is difficult for a gas undertaking to be 100 p.ct. perfect, as is indicated by the following quotation from Mr. Grime's paper: "On making inquiries of the tenant how long he had noticed the smell of gas, the tenant replied, 'Oh, about a week.'"

The Secret of Leadership.

What is the secret of leadership? Dr. Charles Carpenter, President of the South Metropolitan Gas Company, stated in a recent speech that the nation lacked sufficient leaders. In the current issue of the Company's "Co-partnership Journal" the factors which make a man stand out as a guide and inspiration to his fellowmen are discussed. "Just where the secret lies," says the Journal, "is a problem that has baffled generations of men, and will probable baffle generations to come. We seem to have a dim perception that it is to be found in a perfect balance between the individual and the community—a balance that leaves the leader free to develop his own individuality to the full, but at the same time forbids him to take more from the community than he can repay to it in service. But still the mystery remains. There is consolation, however, in the fact that the real leader, when he does appear, cannot be disputed, and instantly takes his place without challenge."

FORTHCOMING ENGAGEMENTS

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Nov. 14.—Institution of Gas Engineers.—Meetings of Publications Committee, 12 noon; Meters Sub-Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Nov. 15.—Scottish Junior Gas Association (Western District).—Visit to Coatbridge Gas-Works.

Nov. 15.—Western Junior Gas Association.—Meeting at Bath.

Nov. 18.—Southern Association of Gas Engineers and Managers (Eastern District).—Meeting at 28, Grosvenor Gardens, S.W. 1, at 2.30 p.m.

Nov. 19.—Society of British Gas Industries.—Meeting of the Council in the morning at 56, Victoria Street, S.W. 1.

Nov. 19.—Society of British Gas Industries.—Autumn General Meeting, Hotel Metropole, 2.30.

Nov. 19.—British Commercial Gas Association.—Meeting of the Executive Committee at 11.30 a.m., 28, Grosvenor Gardens, S.W. 1.

Nov. 19.—British Commercial Gas Association.—Meeting of the General Committee at 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Nov. 20.—Gas Companies' Protection Association.—Annual General Meeting at Caxton Hall, Westminster, 2.30.

Nov. 21.—Southern Association of Gas Engineers and Managers.—General Meeting in London.

Nov. 21.—London and Southern District Junior Gas Association.—J. M. Webber, "Electrical Plant as Applied to Gas-Works."

Nov. 21.—Scottish Junior Gas Association (Western District).—Visit to Beattie's Bakery, Dennistoun, Glasgow.

Nov. 22.—Yorkshire Junior Gas Association.—Meeting at Bradford.

Nov. 24.—Institution of Gas Engineers.—Meetings of Executive Committee, 2 p.m.; Finance Committee, 3.30 p.m.; Council, 4 p.m.; at 28, Grosvenor Gardens, S.W. 1.

Nov. 25-26.—Institution of Gas Engineers.—Autumn Meeting at the Incorporated Accountants' Hall, Victoria Embankment, W.C. 2.

Nov. 29.—North of England Gas Managers' Association (Auxiliary Section).—Meeting at the Gas Office, Newcastle-on-Tyne, 2.30.

ELECTRICITY ON GAS-WORKS

A New Book by H. C. Widlake, A.M.I.E.E., Assoc.M.Inst.Gas E., published by Walter King, Ltd., "GAS JOURNAL" Offices, 11, Bolt Court, Fleet Street, E.C. 4; price £1 1s. net.

Reviewed by E. G. STEWART, M.Inst.Gas E., of the Gas Light and Coke Company.

The employment of mechanical power in gas-works would appear to date from about 1850, when the gas exhauster became general, and it has extended in succeeding years through pumps, ammonia washers, stoking machinery, coal and coke handling plant, to the present widespread use. This process of evolution, accompanied by a demand for absolute reliability and continuity of operation, has resulted in the small local power unit becoming a characteristic of gas-works power practice.

In the earliest days the prime movers were exclusively steam; later the gas engine, having reached a high state of efficiency, was extensively installed. To-day the low cost of production of steam from the sensible heat of spent gases is leading to a reversion to steam. Although the local power unit has been a predominant feature, the transmission of energy from a central unit has been practised in the case of individual plants for coal handling, for retort house units, and for similar portions of the plant. For these purposes rope or chain drives, compressed air, hydraulic power, and electricity (of which more anon) have had their turn. The centralization of power production and the co-ordinated distribution of the resulting energy throughout the works has, however, been almost non-existent. Some thirty years ago the introduction of the de Brouwer stoking machine was accompanied by the necessity of driving it electrically, and so began the use of electrical power in the manufacturing stations of the gas industry. Such installations earned a reputation for the daring of those engineers bold enough to commit, in the eyes of many of their colleagues, so rash a step. Even to-day there are to be found members of the gas profession to whom the use of electric power is, to say the least, distasteful. The march of progress will sweep them aside. To-day it is necessary to employ all and every efficient means for reducing costs of production; and if the application of electricity for power purposes can be shown to fall in this category, it ought to be adopted swiftly by the industry.

Progress is not the prerogative of any industry, and it is but natural that the motors, cables, and switchgear available to-day for the severe conditions of use imposed by gas-works should be vastly better, and more reliable, than were their prototypes of a quarter of a century ago. In those days and for several years following, there were difficulties to be surmounted in the use of electricity under arduous conditions of service. Fortunately, too, there were men who devoted time and thought to the solution of these difficulties; and reference to the pages of the "GAS JOURNAL" for 1914 and later years will show that Mr. H. C. Widlake was then giving the industry the benefit of his experience with gas-works applications of electricity. These articles were of the greatest value. To-day, Mr. Widlake has crystallized his long experience of matters electrical in the service of the gas industry into a volume of handy size.

The book, which is entitled "Electricity on Gas-Works," is divided into seventeen chapters, and discusses the whole field of this application of electricity, including the association with the costs of power production by various methods, including waste-heat recovery; the economics of electric drives; and the location, selection, and operation of generators, motors, and distribution systems. Attention is also given to the conversion to the electric drive of various units of gas plant, and in one chapter the Author describes his own well-known contributions to the industry of stock and pressure indicators and governor loading devices.

The book is carefully arranged, clearly written and illustrated, and is provided with a very complete and valuable index. The information is obviously the result of long experience combined with deep insight and wise judgment. It would be difficult to criticize adversely any of the frequently occurring *obiter dicta*.

The use of gearing in direct connection with the armature of motors is a practice which seems to commend itself to Mr. Widlake. The examples illustrated, however, show types which are likely to wear quickly. In such a case vibration is set up which results in commutator trouble, and this trouble is often credited to causes other than the real one. Gearing, if used, should run in oil baths; and some form of flexible drive is to be preferred. Even on this point, however, much depends on the design, and in general the Author's conclusions upon everyday running problems are very sound, and will repay study even by those familiar with electric power applications.

Mr. Widlake has evidently not intended that his work should completely cover the needs of the largest gas-works. Indeed, this is apparent from his statement that "only on the very largest works a case for privately generated A.C. can be made out." From many points of view this is a correct statement. It should be borne in mind, however, that the standardization of the alternating current system throughout the country will lead to a concentration of attention upon the development of A.C. switch-gear, motors, &c., with inevitable reduction in their costs and increased efficiency in operation. For this reason, what is good policy to-day may not be so favourable in a few years. There is the further point that although entire reliance upon the public supply is inadvisable for a gas undertaking, yet capital expenditure can often be avoided by making use of a stand-by supply. If D.C. plant is used, this would need conversion from the A.C. mains, and entail the purchase of converting plant almost as expensive as a generating unit. The advantages of alternating current from the distribution point of view are fully discussed, and the speed characteristics of A.C. and D.C. motors are compared. Outside of these references, the whole of the book is concerned with direct current electricity.

Mr. Widlake appears to favour the electric driving of the fans of waste-heat boilers, principally on the score of the great improvement in the load factor of the generating plant which can be secured in this manner. He is careful, however, to point out the difficulties and pitfalls which lie in the application of such drives. Seeing that a vicious circle is so easily set up, say, by the tripping of a breaker in the power house, which stops the boiler motors, cuts off the flow of hot gases, and finally reduces the steam pressure to a dangerously low level in a very few minutes, it is doubtful if this is a game worth the candle. The use of steam-driven fans obviates this unpleasant risk; and although these fan turbines may be inefficient compared with a main generating engine, yet all the heat in the exhausted steam can be transferred to the boiler feed.

While the strong and weak joints of various designs of motors and control gear are considered in detail, the author has refrained from laying down any ideal specification. Electrical plant especially designed for gas-works requirements is now obtainable from the best makers; and apparently Mr. Widlake holds the view that unless the buyer is particularly conversant with matters electrical, it is better to go to such a firm of manufacturers and to rely upon their advice. This is an excellent attitude, provided that the maker is not tied in his selection by the necessity of competitive tendering. If competition is desired, then a close specification is really called for.

Mr. Widlake has not entered upon the domain of the electrical text book, but he has produced an ideal *vade mecum* for the Gas Engineer embarking upon the use of electricity on his works, and, as this review will perhaps have indicated, a volume full of interest and value to those who have already had experience in the direction of applying electricity to gas-works.

PERSONAL

RETIREMENT OF MANCHESTER OFFICIALS.

Mr. George William Tooley and Mr. William Buckley retired under the Superannuation Scheme of the Corporation from the positions of Manager of the Rochdale Road Works and the Droylsden Works respectively, and were entertained at luncheon on Nov. 7.

Alderman J. Harrison, Chairman of the Gas Committee, presided, and he was supported by the Deputy-Chairman (Alderman Chapman) and also the Chairman and Deputy-Chairman of the Rochdale Road and Droylsden Stations (Alderman Whitworth and Councillor Fairfoull), together with Alderman T. Cook, the late Chairman.

After many expressions of appreciation by the Chairman, Members of the Gas Committee, the Chief Engineer, and other members of the staff, Alderman Harrison presented to Mr. Tooley a gramophone and to Mr. Buckley a portable typewriter as tokens of the esteem and regard of their colleagues.

Mr. Buckley entered the service of the Gas Department in 1889 as an Assistant Chemist at the Gaythorn Works, and was later transferred to the Rochdale Road Works. In 1916 he was appointed Manager of the Droylsden Works, and this position he has held for the past fourteen years. He has taken a great interest in various technical societies, and particularly in the Manchester and District Junior Gas Association, of which he was President in 1917. Among his many contributions to the gas industry probably the best known are "Analysis of Coal Gas" and the "Cost of Maintenance of Vertical Retorts." He was a lecturer at the Manchester College of Technology for 25 years.

Mr. Tooley was appointed Deputy Manager of the Rochdale Road Works in 1898 and Manager in 1905. Prior to coming to Manchester he held appointments at Leeds and Nottingham. He is the patentee of Tooley's dry main, and has also patented a horizontal setting and one for the heating of vertical retorts.

Mr. RONALD BROWN GLOVER, M.C., Assoc.M.Inst.C.E., has been elected to the position on the Board of Directors of Messrs. West's Gas Improvement Company, Ltd., made vacant by the death of his father, the late Mr. Samuel Glover.

Mr. JOHN FREDERICK WEST, M.A.Cantab. (Engineering), the eldest son of Mr. F. J. West, has been appointed to the Board of the Derbyshire Silica Firebrick Company, Ltd.

Mr. S. J. INGRAM, Vice-Chairman and Managing-Director of the Camborne Gas Company, Ltd., was at the last meeting of the Board unanimously elected Chairman of the Company, in succession to Mr. J. R. Rowe deceased.

On the occasion of his retirement, after 36½ years' service at the Aberdeen Corporation Gas-Works, Mr. JOHN WRIGHT, of the Engineering Department, has been presented with a smokers' cabinet by his colleagues.

Mr. "TOM" BROOKS, of Charlotte Street, Blackburn, has just completed half a century's service with the Blackburn Corporation Gas Department. It is claimed that he has only been away from his post for one period of ten days consequent upon an attack of influenza. Despite his 67 years he is still hale and hearty and is looking forward to many more years of useful service. He has served under five Engineers and Managers.

OBITUARY

CHARLES STAFFORD ELLERY.

The death occurred at his residence at Combe Down, Bath, on Saturday last of Mr. Charles Stafford Ellery, for 35 years Engineer and Manager of the Bath Gas Company, and subsequently Consulting Engineer and a Director of the Company. Deceased was born at Swansea, and served his articles with Mr. Thornton Andrews. In 1873 he was appointed Secretary and Manager to the Neath Gas Company, whose undertaking was acquired by the Corporation in 1874, and he held this position until he obtained the post at Bath. Before leaving Neath he constructed practically new works, while at the Bath Gas-Works he carried out considerable extensions and alterations, including the introduction of regenerator furnaces, stoking machinery, and water gas plant. He joined the British Association of Gas Managers in 1874, and passed into the Gas Institute, of which he was President in 1897, when the meeting was held in Bath. Two years previously he read a very useful paper, in which he described some improvements in the methods of manufacturing sulphate of ammonia. He was a member of the Institution of Gas Engineers. He was also a member of the Midland and the Southern District Associations, and filled the position of President of both—of the former in 1891, and of the latter in 1910. He was an Associate Member of the Institution of Civil Engineers; having been elected in 1881. He leaves five daughters.

The death has taken place at Ayr of Mr. J. C. HIGHET, a Director of the Ayr Gas Company. A member of Ayr Town Council, he was well-known in the town, and was a member of many public bodies.

CORRESPONDENCE

A.G.A. Water Heating Publication.

SIR,—We have noticed and appreciate the favourable comments on the new "Water Heating" book, in the Editorial Notes of your issue for Oct. 8.

While you have correctly stated that the price of the book to non-members of the American Gas Association is $3.00 per copy, we shall be very pleased to extend the member price of $1.50 to our English colleagues.

I should like to call your attention to a typographical error in my name as given in the write-up.

C. GEORGE SEGELER,
Industrial Editor.

American Gas Association,
420, Lexington Avenue,
New York City,
Oct. 28, 1930.

The Gas Salesman.

SIR,—Keen competition now demands thoroughly efficient salesmanship; and it is to be hoped that the Educational Scheme which is about to be launched under Mr. H. Whitehead will be a means of recruiting salesmen fully competent to ensure the development of our industry.

Men of good education, courteous, tactful, with a thorough knowledge of gas apparatus and its uses, and of competitive points in regard to electricity, are needed. Such men at present are scarce, but what is the reward for their educational efforts?

I see in this week's "JOURNAL" that the Stockton-on-Tees Corporation Gas Department are advertising for a Gas Showroom Manager with experience, and the candidate fortunate enough to secure the appointment is to receive £3 9s. 3d. per week, and, provided he is satisfactory after four years' service, he may hope to reach as much as £4 12s. 4d. per week.

Recently the Great Grimsby Gas Company were advertising for a trained salesman at a salary of £3 10s. per week—for a really good man!

If these are indications of the value of trained salesmen, is there likely to be a great rush to enrol as students in the Educational Scheme? I think the answer is in the negative.

"SALESMAN."

Nov. 7, 1930.

British Tar for British Roads.

SIR,—It has been stated recently that the country's future prosperity is fundamentally wrapped up in the increased use of coal. Now the gas industry forms one of the largest groups of coal consumers in the country, using more than 18,000,000 tons annually, and incidentally supplying the electrical undertakings with power in the form of coke. The disposal of its bye-products is essential to the economic development of the industry, and at the same time is of direct importance to the country's well-being.

Tar is one of the principal of these bye-products of the gas-works, and on its sale at a fair price depends to a considerable extent the price of gas to the consumer.

Time and time again British tar of standard specification, as well as proprietary tar preparations, has been shown to be equal, if not superior, to all other forms of road dressing.

These tars provide hard-wearing surfaces, with good grip for motor traffic, and they are not expensive. Is it too much to ask, therefore, that good quality tar should be more generally used instead of materials of foreign origin?

ARTHUR E. COLLINS,
Past-President, Institution of Municipal and County Engineers.

10, *Cambridge Road, Colchester,*
Nov. 1, 1930.

A National Nomenclature for Coke Sizes.

SIR,—In spite of the Editor's warning—" fools rush in, &c.," —I venture to accept the invitation to contribute to this subject.

As though disapproving of the suggested nomenclature that ¾ in. to ½ in. coke shall in the future be known as bean coke, you refer (" JOURNAL " for Oct. 29, p. 278) to small coke ¾ in. to ½ in., and thus prove the inadequacy of the suggested doctrine.

In order that we may sell coke it does not follow that our customers must learn a new nomenclature. Such mental effort must not be expected of the millions of customers (and potential customers); this mental effort is the natural burden of the few—the coke salesmen.

I therefore suggest that coke shall be sold under one simple nomenclature—" Coke "—and that its grading shall be characterized by coupling its grade thus: ¾ coke ½. Thus, the coke grade is between the limits of ¾ in. mesh screen and a ½ in. mesh screen.

It is known that the meshes of screens vary, some being round, some square, some slots, some new, some worn, and some spaces between screen-bars; nevertheless, any difficulty engendered by these variations is due to differences within the gas industry, and it must not be passed on to confuse the customer.

AD REM.

THE NEWS OF THE WEEK

1931 Associate-Membership Examination of the Institution of Chemical Engineers application forms and particulars, together with the Memorandum on " The Training of a Chemical Engineer," may be obtained from the Hon. Registrar, Institution of Chemical Engineers, Abbey House, Westminster, S.W. 1.

A Memorial Service was held on Sunday, Nov. 9, at the Offices of the Sheffield Gas Company, Commercial Street, Sheffield, conducted by the Rev. A. J. Talbot Easter. Wreaths were placed on the Gas Office War Memorial by the General Manager, Mr. Ralph Halkett, and other members of the staff.

The Inspector of Gas Meters for Bristol (Mr. E. H. Harvey) in his quarterly report to the Town Council states that of the 2337 gas meters examined and tested 349 were incorrect, and of these 160 passed gas without registration, and one would not work. There were 115 meters favouring consumers and 73 favouring the seller, but the percentage of error in the former class averaged 13·37, against only 5·75 in the case of the latter.

The Closing Down for Six Months of Messrs. Baldwins Coke Ovens in order to carry out some necessary repairs has made it necessary for the Port Talbot Gas Department to re-open the Margam Works which have been shut for some considerable time—ever since the Corporation were enabled to receive a supply from the coke oven plant. The Mayor of Port Talbot explained the difficulty to a meeting of the Council last week when he pointed out that, strictly speaking, Messrs. Baldwins were under an obligation to continue supplying the Corporation under the terms of the agreement between them. It had to be borne in mind, however that Port Talbot was singularly fortunate in still retaining such a valuable industry for its inhabitants as the Margam Works. He recommended under the circumstance that the Company's offer of a thousand tons of coke and £50 towards the cost of lighting up be accepted, and this was agreed to without dissent.

A Lecture on Gas Lighting was given at Kidderminster recently by Mr. G. A. Sawyer, of Messrs. W. Sugg & Co., Ltd., under the auspices of the Kidderminster Gas Company, which was attended by the Mayor, Messrs. G. P. Lea and J. E. Talbot (Directors), and employees of the Company, together with representatives from Stourport and Bewdley Companies. Mr. Sawyer gave a general resumé of many forms of lighting of years ago and the present age, the scientific construction of gas lighting burners. He emphasized the properties of gas lighting and its superiority over other forms of artificial lighting, particularly for needlework, &c.; its soft rays did not affect the eyes of the worker, also it was possible to compare coloured materials by incandescent gas light owing to its near approach to daylight, and for this purpose alone gas light was used in most dye houses in the North of England. The Mayor proposed a vote of thanks to the lecturer, which was seconded by Mr. Lea.

The Adaptation to Gas Firing of several boilers at the Rotherham Municipal Offices and Town Hall has been under consideration by the Borough Engineer, and it has been decided that one boiler at the Municipal Offices be thus adapted for experimental purposes.

The Montevideo Gas and Dry Dock Company, Ltd., have declared an interim dividend for the half-year ended June 30, 1930, of 3 p.ct. (actual), free of income-tax at 4s. 6d. in the £, payable on Dec. 1, on £675,000 ordinary capital. For the corresponding period of the previous year, the interim dividend was 3 p.ct., free of tax at 4s. in the £, on £600,000 ordinary capital.

The Use of Road Tar in France has largely increased during recent years. The material first came into prominent use about 1922, when 30,000 tons were employed. By 1925 the consumption had increased to 135,000 tons, and by 1927 to 182,000 tons. Since then the rate of expansion of this outlet for tar has been even more rapid, as is seen from the figures of 232,000 tons for 1928, and 367,000 tons for 1929.

The Official Inspector of Gas Meters to the City of Edinburgh, in his report for the year ended May 15, 1930, states that the number of gas meters tested and examined amounted to 70,286 —612 wet meters and 69,674 dry meters; and fees to the amount of £3981 14s. were earned. The total number of meters tested and examined by this Department since its institution in 1861, up to and including May 15, 1930, amounts to 3,926,511—the fees received for the same period being £133,969. There are now seven District Gas Meter Testing Stations under the jurisdiction of the Magistrates (the Local Authority for the administration of the Sale of Gas Acts). Of the 69,674 dry meters tested, 711, or 1·02 p.ct., were rejected as incorrect; and of the 612 wet meters tested, 16 or 2·61 p.ct., were rejected as incorrect.

The Disposal of Effluents from the new sulphate of ammonia plant into the town sewers came under discussion at a recent meeting of the Market Harborough Urban District Council Gas Committee, when the Manager reported that the Ministry of Health was concerned with the problem, and that he had had an interview with an official of the Ministry in London in regard to the matter. A letter from the Ministry was read stating that the Minister was prepared to sanction the necessary borrowing on the understanding that the Council would be prepared to incur such further expenditure as might be required either at the gas-works or the sewage disposal works, should it be found necessary, when the rate of discharge of spent liquor to the sewers is increased as proposed. In consequence of this, the Manager has further considered the question and submitted a revised report suggesting the purchase of a 1½-ton plant instead of a 2-ton plant as previously decided upon, at a cost of £1400 instead of £1700. The Committee approved the Manager's report.

THE NEWS—*continued.*

Another Undertaking Adopts a "Gas Unit."

The Mossley Corporation Gas Department propose to increase their declared standard of quality from 500 B.Th.U. per c.ft. to 511·8 B.Th.U. per c.ft. They also propose to adopt a gas unit of 3412 B.Th.U. Thus 1000 c.ft. of Mossley gas at 511·8 B.Th.U. per c.ft. will equal 150 units.

The following are the proposed prices for gaseous energy from the final reading of the meters in the September Quarter, 1930:

Industrial. For All Purposes, including Lighting.

—	Within the Borough.	Outside the Borough.
	Pence per Unit.	Pence per Unit.
First 4,500 units per annum. . . .	0·300	0·31364
Next 33,000 ,, ,, ,, ...	0·265	0·27864
,, 37,500 ,, ,, ,, ...	0·260	0·27364
,, 37,500 ,, ,, ,, ...	0·255	0·26864
,, 37,500 ,, ,, ,, ...	0·250	0·26364
,, 37,500 ,, ,, ,, ...	0·245	0·25864
,, 37,500 ,, ,, ,, ...	0·240	0·25364
,, 37,500 ,, ,, ,, ...	0·235	0·24864
,, 37,500 ,, ,, ,, ...	0·230	0·24364
,, 37,500 ,, ,, ,, ...	0·225	0·23864
,, 37,500 ,, ,, ,, ...	0·220	0·23364
,, 37,500 ,, ,, ,, ...	0·215	0·22864
,, 37,500 ,, ,, ,, ...	0·210	0·22364
,, 37,500 ,, ,, ,, ...	0·205	0·21864
,, 37,500 ,, ,, ,, ...	0·200	0·21364
,, 37,500 ,, ,, ,, ...	0·195	0·20864
,, 37,500 ,, ,, ,, ...	0·190	0·20364
,, 37,500 ,, ,, ,, ...	0·185	0·19864
,, 37,500 ,, ,, ,, ...	0·180	0·19364
,, 37,500 ,, ,, ,, ...	0·175	0·18864
,, 37,500 units & all above per annum	0·170	0·18364

The above scale will apply to all mills, workshops, bakers, cinemas, signs and shop window lighting, and public lighting.

Domestic Supply.

—	Within the Borough.	Outside the Borough.
	Pence per Unit.	Pence per Unit.
First 4500 units per annum	0·300	0·31364
All in excess of 4500 units per annum .	0·233	0·24664

The above table relates to consumption through ordinary meter.

These charges cover the rent of one gas fire or one gas iron fitted free.

Where consumption is through prepayment meter, the price will be:

First 4500 units per annum	0·340	0·35364
All in excess of 4500 units per annum .	0·273	0·28664

These charges cover the rent of any two of the following, fitted free: Cooking stove, gas fire, or gas iron.

These scales are *not* subject to any consumers' power factor, nor to any coal clause; no meter rent is charged, and there are no minimum charges of any description.

The West Lipped Bucket Conveyor.

It is over fifty years since Mr. John West entered the field of coal handling, and later coke handling, in the gas industry. Twenty-five years ago Messrs. West's Gas Improvement Company was world-renowned for the West stoking machinery and for the whole gamut of coal and coke handling plant associated with carbonization in gas-works. In the interval the development of the Glover-West system of continuous carbonization in vertical retorts has loomed so large in the eye of the technical world that sight has been lost of the fact that each of the nearly 300 installations of vertical retorts has brought with it its own problem of coal and coke handling. The solution of these problems and the building of a very large department for the carrying out of this and other kinds of structural steelwork has resulted in an amount of experience which places the firm in an excellent position to cope with every variety of coal, coke, and ash handling which is likely to arise in any of the fuel-using industries.

To-day we have the fruits of this experience in a handsome brochure in which the West lip-bucket conveyor is fully described in detail, together with a very large number of examples of its application. Particularly fascinating is the simultaneous handling of two different classes of material, as, for example, coal to the carbonizing plant, together with the residual coke, at one and the same time in the same conveyor. The same idea, of course, is applicable to coal and ashes from boilers, coke and clinker from water-gas plants or producers, and so on.

In the same brochure most of the other types of conveyor and elevator, together with other kinds of machinery associated with handling problems, are profusely illustrated and described. For instance, it is a fact which has not been fairly recognized that Mr. John West and his technical staff were the first engineers to handle coal on a band conveyor in this country.

As long ago as 1884 the band conveyor carrying coal across from one side of a horizontal retort bench to another was standardized in connection with West's stoking machinery. And to-day the firm are erecting many conveyors of this type in connection with their installations of vertical retorts. The fixed bucket elevator was, of course, earlier in the field, together with coal breakers, mechanical feeders, and coke screens, in all of which directions West's Gas Improvement Company can claim with justice to have been pioneers.

The present brochure will, we feel sure, merit a place in the reference library of every mechanical engineer responsible for the arrangement of machinery in connection with gas-works and power station design.

Gas to Light New Coventry Thoroughfare.

The Coventry City Council recently approved the recommendation of the General Works Committee that Corporation Street (a new thoroughfare now in course of construction in the centre of the city, be lighted by high-pressure gas, that the positions for eleven street islands be approved, and that two-arm lamp standards be erected on each island, each arm to be fitted with a 1500-c.p. high-pressure lamp.

Alderman Batchelor described the steps which had been taken to ensure that the street should be adequately lighted. A joint Sub-Committee of the General Works and Watch Committees had considered the question. Their aim was to illuminate the thoroughfare so as to make it as popular as they could. It was their wish that it should be lined with buildings as soon as possible. Consequently, the gas and electricity departments had been asked to present schemes, each of which had been considered. The Chairman of the Watch Committee, the Chief Constable, the City Engineer, and himself then paid a flying visit to London and visited a new road at Lewisham, where one section was lighted by gas and another section by electricity. The result was that the four of them came to a unanimous decision in favour of high-pressure gas.

High-Pressure Reactions.

On Friday, Oct. 31, a public lecture on "High-Pressure Reactions" was delivered before the Institution of Chemical Engineers by Prof. W. A. Bone, F.R.S., in the Lecture Theatre of the Institution of Civil Engineers, at which the President of the Institution, Mr. J. Arthur Reavell, occupied the Chair. The growing importance of the subject and the fact that the lecturer is one of the pioneers in this field made the occasion profitable to all who attended.

The lecturer dealt briefly with the historical events leading up to an understanding of the rôle played by pressure in gas reactions. Within a period of less than fifty years was included the first recorded synthesis of ammonia from its elements by the agency of a catalyst, the statement of the principle of mobile equilibrium, and the classical work of Haber and his collaborators upon equilibrium in an ammonia-nitrogen-hydrogen system.

A more recent development had been the synthesis of various organic compounds from water-gas by the employment of suitable catalysts and high pressure, which had opened up a wide field for future exploration. It seemed probable that in the course of the next few years the chemical industry would be profoundly affected by the result of work now in progress.

The variety and complexity of these new processes, however, called for much systematic and fundamental research before a clear understanding of their mechanism could be obtained. A large amount of work had already been carried out, but a glance at the patent literature of the last few years would show that much of it had been of a purely empirical character and that a great deal of unnecessary overlapping had taken place.

Prof. Bone devoted a portion of his lecture to a consideration of the logical method of developing a reaction from a laboratory experiment to a works-scale process. Anyone engaged on the study of high-pressure gas reactions would be aware of the difficulties encountered through the lack of reliable fundamental data on the physical properties of gases. No more useful link could be undertaken at present than a comprehensive determination or re-determination of such data as the compressibility of gases and of mixtures of gases and the effect of pressure on viscosity, di-electric strength, solubility, and thermal conductivity. Although such work fell within the scope of a high-pressure gas research laboratory rather than of a works routine laboratory, the cost of equipping and maintaining such a laboratory had hitherto proved an insuperable barrier.

Some three years ago, however, a complete high-pressure gas research laboratory had been established in the Department of Chemical Technology at the Imperial College of Science, and work had been commenced on a number of physical problems directly connected with high-pressure reactions. The lecturer

gave a brief account of the progress made to date, including the results of determinations of equilibria in various gaseous systems, of isotherms, of gases and gas-vapour mixtures, and of experiments on the production of oxides of nitrogen in gaseous explosions.

The lecture was well illustrated by slides showing the different types of apparatus in use for carrying out various high-pressure reactions, and will appear in full in the Transactions of the Institution of Chemical Engineers, Vol. 8.

Cookery Demonstrations at Stalybridge.

There have been encouraging attendances at the Stalybridge Gas Department Showrooms, Stamford Street, recently, at the cookery demonstrations conducted by Miss H. H. Tuxford, M.C.A., Gold Medallist Diplomée, Board of Education. The object of the demonstrations was to show the uses to which gas could be put for domestic purposes. There was a special exhibition of old and new gas appliances for gas cooking, heating water, heating and lighting on Saturday, Nov. 8.

The exhibition was opened by Councillor J. W. Greenwood, J.P., Chairman of the Gas Committee, in the presence of a large crowd, and he was accompanied by Mr. W. Hill, the Gas Manager.

Councillor Greenwood referred to the advantages of cooking, heating and washing by gas, and also to the importance of smoke abatement in order to ensure a healthy atmosphere. He also referred to the fact that graded coke was now on sale at the gas-works at 1s. per bag, delivered in any part of the town.

There was a fine exhibition of gas cookers, gas fires, &c., while the gas switch was also demonstrated.

A New "Practical Guide to Investment."

At the present time, following a period in which there have been many happenings causing disturbance of business and financial conditions, a sound work dealing with investment may be considered opportune; and there is before us now a careful and comprehensive guide reviewing the whole subject and indicating which classes of stocks and shares are the most dependable, and for what reasons. The author is F. W. H. Caudwell, B.A.; and it is published by Effingham Wilson, 16, Copthall Avenue, London, E.C., at the price of 7s. 6d. net. The book has been designed to fulfil the need of professional and business men and women of getting a clear view of exactly what the present-day field of investment offers, and to show how money may be invested safely and to the best advantage.

Many industries are dealt with, and mention is made of more than 300 sound securities of all types. Gas, of course, has a chapter, in which the author says: "This market undoubtedly offers excellent opportunities for people who want securities of a purely investment character and to provide a fair return." Mention is also made of the current quotations which are given weekly in the "JOURNAL." The author acknowledges his indebtedness to the B.C.G.A. for some useful statistics.

The book ends with a chapter entitled "Saving of Income-Tax" and appendices setting out the rules of trustee investments, minimum Stock Exchange commissions, stamp duties, and so on, with perpetual yield and compound interest tables. The investor needs all the assistance he can get in these days of complicated finance, and Mr. Caudwell's book will be useful to him in many ways.

Bury St. Edmunds Company to Raise Further Capital for Extensions.

Authority to raise a further £6000 capital was given at an extraordinary meeting of the Bury St. Edmunds Gas Company held on Friday, Oct. 31.

The CHAIRMAN (Ald. J. Ridley Hooper), who presided, moved the necessary resolution. In the last ten years, he said the sales of gas had increased from 69 million c.ft. to 90 millions—over 30 p.ct.—while fifty years ago the output was 30 millions. Calling attention to some of the additions and improvements made on the works and in the town, he said in 1927 the year's make of gas had increased to over 82 million c.ft. It was decided to erect a new retort house containing four beds of retorts with modern labour-saving charging and power plant. During this year, the retort house had been further extended, and three additional beds of retorts erected with corresponding additions to the power plant.

Since 1920 very considerable extensions and renewals had been made to the distributing system. The Company had kept pace with modern developments, and every year had shown an increase in business over the previous year, notwithstanding keen competition. In the interest of the stockholders, they considered the method of raising further capital by bonds to be the most economical.

Mr. A. MITCHELL, seconding, said that he did not know any

gas undertaking where the capital had been spent to better advantage. To meet the modern demands for gas, the works had been successfully reconstructed, and the manufacturing plant would bear favourable comparison with any gas company's works of a similar size.

After they had secured this additional £6000, added Mr. Mitchell, the total capital of the Company would be £67,000 (£52,000 of 5 p.ct. stock and £15,000 loan capital), and when the final section of the retort house was completed by the end of this year, their manufacturing capacity would be practically 100 million c.ft. a year. Thus their capital would represent £670 per million c.ft. manufactured.

In connection with the extensions, the Chairman warmly acknowledged the extra work done by the Engineer and Manager (Mr. H. R. Wimhurst) and the Secretary (Mr. A. Oliver Lusher).

Mr. OLIVER LUSHER said that the Directors proposed to raise this money by the issue of 120 bonds of £50 each, repayable 12 months after issue if need be or at any future time by six months' notice on either side. The Directors felt that it was highly desirable to encourage the small investor.

The resolution was carried.

Notes from Scotland.

The Kelty Gas Company have commenced building operations preparatory to installing a new Tully gas plant.

A Reduction in the Price of Gas has been announced by the Kinghorn Gaslight Company, Ltd., by 3d. per 1000 c.ft.

The Gas-Works were Re-Opened at Beaufort (Brecon) some months ago, and it is understood that consumers are now being connected up almost daily. A number of new mains have been laid, and the works are being modernized.

The Haddington Gas Company have disposed of their undertaking to the British Electrical Traction Company, Ltd., who have also purchased works at East Linton and other places in Scotland. The Haddington Gas Company were within a few months of celebrating their centenary, and it is only a little over a year ago since new retorts were installed.

New Holder Inaugurated at East Grinstead.

An interesting ceremony took place at the East Grinstead Gas-Works on Nov. 5. A new gasholder has been completed, and in the presence of the Directors and a few friends Mrs. W. H. Hills, the wife of the Chairman of the Company, turned on the inlet valve and Mrs. J. Hyde, wife of the Company's Engineer, the outlet valve. Mr. S. M. Milbourne, the London representative of Messrs. C. & W. Walker, the contractors, presented these two ladies each with a handsome silver rose bowl as a souvenir of the important event, and the unexpected gifts were received with much pleasure and a few words of appreciative thanks. Subsequently at an informal luncheon the toast of "The Contractors" was warmly drunk, as was also that of "Continued Prosperity to the Company." Testimony was borne to the efficient and expeditious way in which Messrs. Walker had carried out their work.

The opening of the new gasholder marks the conclusion of the third large scheme of reconstruction of the works undertaken by the Company during the last 2½ years, the total cost of which has been over £28,000. The first scheme completed two years ago was the installation of a complete horizontal carbonizing plant, together with charging and discharging machinery, coal elevating and handling plant, and the provision of electric generating plant. The scheme, completed at a cost of £13,000, provides the most modern plant, and its efficiency is being felt financially.

Next came the installation of boosting and governing plant which regulates the pressure required on the district, and a new coal gas exhauster with washing and scrubbing plant, with the enlargement of all the works mains to suitable sizes.

The completion of the new gasholder makes the works equal to any requirements that may be made upon them for a number of years.

The holder is of the spiral-guided type, and has a capacity of half-a-million c.ft., or more than 24 hours' maximum demand at the present time. It is 90 ft. high and 110 ft. in diameter, the steel tank and each of the two spiral lifts being 30 ft., and it is designed so that at some future date a further 30 ft. lift can be added, bringing the total capacity up to 750,000 c.ft.

On completion of the testing the holder was given two coats of a steel corrosion preventative, and will finally be painted a very light grey.

The whole of the work has been carried out by Messrs. C. & W. Walker, of Donnington, Shropshire, at a cost of £12,000.

The negotiations for the loan and Treasury grant, together with the preparing for and supervising the whole of the work, has been carried out by the Company's Engineer, Mr. John Hyde, M.Inst.Gas E., and his staff.

GAS SERVES THE FASHION - - -

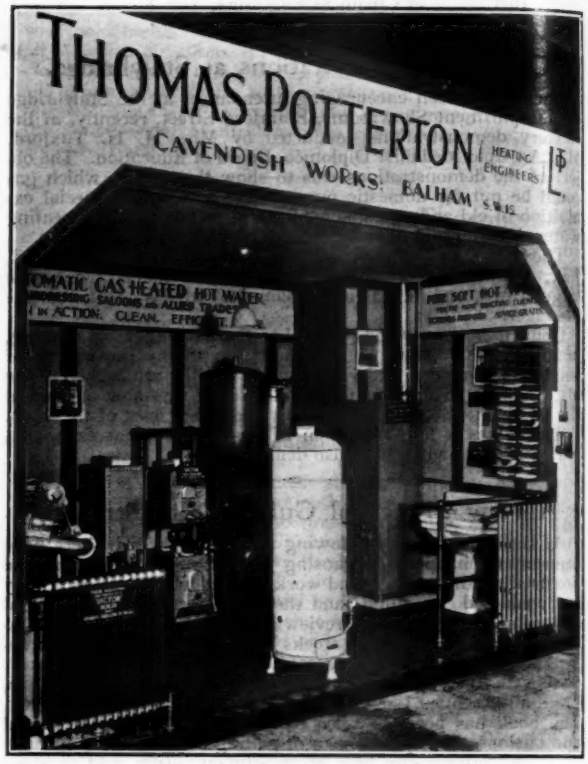
In Modern Hairdressing Saloons Gas Plays an Important Part.

Exhibitions, like many other things, have a tendency to grow as time goes on, and the Annual Hairdressing Fair of Fashion is no exception to this rule. During the past week the Empire Hall at Olympia has been filled with the 1930 display, and with visitors anxious to become better acquainted with the very latest modes of dressing the hair. Competitions and demonstrations have produced a really "live" show, but here we are concerned only with the part which gas can play in what is now one of the great businesses of the country.

One of the exhibits—that by Thomas Potterton (Heating Engineers), Ltd., of Ravenswood Road, Balham, S.W.—has been directed more particularly to meeting the requirements of hairdressing saloons by providing an automatic gas-heated hot water supply for shampoo basins, which are an important part in the modern process of permanent hair-waving, in addition to their use for shampooing and other ordinary purposes. The main feature of the stand has been a completely automatic thermal storage set, in conjunction with one of the latest types of hairdressing saloon lavatory basins, loaned for the purpose by Messrs. H. E. Jarvis & Co., Ltd., of Percy Street, Oxford Street. This has a dual mixing valve for regulating the temperature of the water at the point of delivery. In conjunction with this unit for demonstration, a nickel-plated towel dryer in circulation, operated likewise from the gas-heated set, drew attention to equipment which is asked for in many up-to-date saloons.

The installation provided an example of a complete outfit for demonstration of obtaining hot water under the most economical conditions; the boiler being equipped with luminous flames, with a bi-metal thermostat maintaining the temperature when water is not being drawn off (including the circulating towel rail), with a consumption of 2 c.ft. per hour.

As an adjunct to the hot water supply side of the exhibit, the firm have been showing a small example of central heating with circulating radiators working off a "Victor" boiler with thermostatic control. This is confidently put forward as a most efficient, convenient, and otherwise economical system for warming the sectional cubicles of both ladies' and gentlemen's saloons, and it has been attracting considerable attention on the part of the exhibitors themselves.



ON THE ELECTRICAL SIDE

Turn on the Gas.

"Where gas was not installed, there was a feverish search for candles, and queues were formed outside shops where they could be bought." This is a statement appearing in the "Daily Mirror," when recording the fact that cinemas, shops, houses, and streets in Finchley suffered the inconvenience of a failure of the electric light, which in some cases lasted for an hour. The manager of a cinema said "they turned on the gas, played music, and had speeches from the stage to keep the audience humoured." Gas, once more, was not appealed to in vain.

Hairdressing under Difficulties.

During the past week ladies have been crowding to the Empire Hall, Olympia, where there has been taking place the Annual Hairdressing Fair of Fashion, and many wonderful demonstrations of the art of dressing the hair in modern styles have been staged. Those, however, who selected last Friday evening for their visit—and still more those who then submitted their hair for treatment—were unfortunate, inasmuch as at about 9.20 all electricity, except at a few emergency points, failed. The result was that the whole of the stands were left without power and illumination, so that, we are told, hair-waving processes, except in the latter stages, had to cease. What has not been made clear to us is the state of mind of ladies in whose cases the hair-waving process "had to cease." One exhibitor, at any rate, was lucky enough to possess a stock of tapers which enabled neighbours who were operating on hair-waving to continue their operations. But many housewives, as well as potential customers, must have had their faith in electricity rudely shaken.

State-Aided Electricity.

The report of the Minister of Transport of proceedings under the Electricity (Supply) Acts during the twelve months ended March last recalls the references made in the "JOURNAL" during the past year to the Bedford demonstration scheme for rural electrification. The occasions on which it has been necessary to comment on the publicity and assistance afforded to the electric supply industry, both by official utterances of Government Ministers and the financial support given by politicians, have been many; and unfortunately, the amount of public money set aside for this purpose does not end with the millions of pounds appropriated by the 1926 Act. This further instance, whereby the Treasury has agreed to make advances to the Corporation of Bedford for the purpose of meeting 75 p.ct. of any deficits incurred by the operation of the demonstration scheme (subject to such advances being repayable out of a future surplus), serves to show that the gas industry must continue to struggle for equal recognition of its claims, and, while not desiring to be financially assisted by the State, must be insistent in its demands for legislation to enable gas undertakings to be carried on in an up-to-date and efficient manner.

Combined Gas and Electricity Undertakings.

In the twelve months ended March 31 last, the Special Orders made by the Electricity Commissioners included one promoted by the Liskeard Gas and Electricity Company, Ltd., for the supply of electricity in the Borough of Liskeard, and one by the Farnham Gas and Electricity Company authorizing the raising of additional capital for electricity purposes. At the date of the report the Minister of Transport had under consideration several Special Orders made by the Commissioners and submitted for confirmation—one of them being promoted by the Aldershot Gas, Water, and District Lighting Company, for the purpose of supplying the rural district of Petworth and parts of adjoining areas. The report states that the Minister also had under consideration an application by the Mablethorpe and Sutton Gas Company, Ltd., for a Special Order under the provisions of the Statutory Gas Companies (Electricity Supply Powers) Act, 1925; the matter having been referred to the Minister by the Electricity Commissioners, who declined to make the Order applied for by the Company.

The Minister of Transport has informed the Uckfield Rural District Council that he is not prepared to take any action in regard to revoking the Uckfield Gas and Electricity Company's electricity powers. The application, originally made in July,

1929, was renewed in January, 1930—on the grounds that the Company had not laid distributing mains in certain parishes in the area of the Local Authority; but the Minister declined to take action in the matter, after a "careful consideration of the steps which the Company were taking to provide a supply in the area in question and of the reasons advanced by the Company for not having commenced the establishment of their undertaking at an earlier date."

Another Shock.

Should any of the victims have happened to come from Reigate, the shock in their case may have been less severe, for they will already have heard of a temporary curtailment of electricity supply at home. The Mayor and the Town Clerk of Reigate, under date of Nov. 5, notified all electricity consumers that, "owing to a serious breakdown at the generating station, the plant available is not sufficient to maintain an adequate supply for this period of the year. It is therefore incumbent upon all consumers to curtail the use of electricity for all purposes—especially for power and heating—between 4.30 p.m. and 8 p.m. each day, Sundays excepted, until further notice." The ominous point was made by them that, "unless this request is complied with, there will be a serious danger of one or more districts being temporarily disconnected from the works."

We have in mind in this reference merely the inconvenience to consumers; it is no part of our purpose to apportion blame. The final sentence of the notice, however, seems to have been framed to indicate that "someone has blundered." The sentence reads: "The Council, not having been permitted to install additional plant, has been relying upon a bulk supply being available, as promised, by the 1st of October, which, however, has not been realized, and, under these circumstances, cannot accept any liability for this inefficiency in the supply."

GAS SERVICE - - -

Discussed from the viewpoint of the Gas Salesman.

New Gas Showrooms for Rhymney.

During the course of next month new gas showrooms are to be opened by the Rhymney and Aber Gas Company. The old premises were destroyed some months ago by fire.

Gas Exhibition at Tredegar.

Out of a total population in Tredegar of some 25,000 persons, no less than 12,000 visitors attended the recent exhibition of gas appliances held under the auspices of the Gas Department. A large number of orders for new cookers, &c., were booked during the course of the exhibition.

Slot Machines for Gas Mantles.

Slot machines for gas mantles are being installed at various places in South London. "The new machines mark a further step forward in the twenty-four hour service system which the gas industry has given to the public during the last hundred years," stated an official of the South Metropolitan Gas Company. "Should a mantle become broken, all a customer has to do is to put sixpence in the slot for a new 'Metro' mantle of standard quality. More than thirty machines have been installed already in large blocks of flats, outside shops, and at other convenient positions. Before long it is hoped that they will be fixed also at all railway stations throughout the 52 square miles of the Company's area."

Selling Gas for Steam Raising.

The Burnley Gas Department have extended easy purchase terms to gas-fired steam and hot water boilers. On and after the September quarter meter readings, the following reduced 4-part system of charge will apply for gas used for gas-fired steam boilers for all purposes and hot water boilers for central heating by any consumer who considers such a scale would be advantageous.

Four-part charge—

Customer charge (fixed) . . .	£1 1s. 4d. per annum
Manufacturing demand charge .	£0 5s. 4d. per annum per 100 c.ft. per day max.
Distribution demand charge . .	£2 16s. 0d. per annum per 100 c.ft. per hour max.
Commodity charge	£0 0s. 2d. per therm on all gas consumed.

Accounts will be rendered monthly, and a discount of 5 p.ct. will be allowed on all the above items, with the exception of the commodity charge, for payment of the whole of the account within fourteen days.

Method of Submitting Estimates.

At the last meeting of the West Riding of Yorkshire Circle, Mr. A. Wylie, of Sheffield, speaking of the method of tendering or submitting estimates, suggested that the best plan was to start at the main, to the inlet and then the outlet of the meter, right through in the proper order to the appliance, giving a description of the goods quoted for. It was his experience that business people receiving a business-like statement in proper sequence were much more impressed than by a jumbled mass of facts and figures. The fixing of appliances on approval was another very good point, and the percentage of returns from such cases was remarkably low. Surely this could be taken as a sign of an increase of effort being needed in this direction. At the same meeting Mr. S. H. Packer, of Bradford, said that in his town, whenever a change of policy was adopted, the inspectors were told about it and their efforts enlisted in sales promotion. They were provided with a form on which they recorded every possible inquiry, and these forms were passed to the Sales Department to be dealt with by a salesman on the district. The inspectors had not the time to conclude a sale, and, on the follow-up of inquiries submitted, a small commission was paid them for every completed order.

Cookery Demonstrations at Bristol.

The Bristol Gas Company have arranged a series of lectures and practical cookery demonstrations for the winter, the first of which was held on Nov. 3 in the Colston Hall, Bristol, and was so well attended that already arrangements have had to be made to provide extra accommodation.

The lectures, which are free, will be continued in the Colston Hall in a larger room, every Monday afternoon at three o'clock, until further notice. Later, the lecturer, Miss G. E. Richardson, will tour the suburbs including Bedminster, Brislington, Bishopston, Fishponds, Shirehampton, and Keynsham, giving free demonstrations.

At the first lecture, Miss Richardson selected three breakfast dishes, and took her audience step by step through the process of making the dishes and then passed the finished articles round for inspection. For the purpose of the demonstration, Miss Richardson used the latest types of gas cookers and detailed their outstanding qualities, which ensure, it is claimed, efficiency in cooking, saving in labour, ease of manipulation, and cleanliness in use.

In connection with these cookery lectures, the Bristol Gas Company are carrying on a progressive poster campaign and distribution of leaflets and invitation cards calling attention to the demonstrations.

A Model Village—and Gas.

The current issue of "A Thousand and One Uses for Gas" tells of the use of gas in the old-world village of Thorpeness in Suffolk. Phenomenal growth has taken place here during the past few years, no less than £66,000 having been spent in building holiday or permanent homes on the estate.

A particular feature of this highly organized village is a system whereby any owner of a house there can, by giving twelve hours' notice, be assured of having the house thoroughly clean and aired, with groceries and all other domestic necessities ready for them on their arrival. There is not a single house of any importance in Thorpeness which is not equipped with gas for cooking and heating purposes, and in many of them it is also used for water heating and for lighting. In fact, 95 p.ct. of the houses in the village are provided with a supply of gas.

In the Golf Club House all the cooking is done by gas and there is a very well equipped kitchen. Almost all the cooking at the County Club is also done by gas, and the consumption of gas on these premises during the busiest five weeks of the year amounts to no less than a quarter of a million c.ft. The kitchen at the Dolphin Inn is fully equipped with gas, while the dining room and lounge are heated by gas radiators, and the smoke room is kept comfortably warm by a modern gas fire.

British Road Tar Association

ADDRESS BY THE PRESIDENT, SIR DAVID MILNE-WATSON, D.L., LL.D., AT THE THIRD ANNUAL MEETING

Adequate transport facilities and their efficient working are now generally recognized as one of the most important aspects of the country's economic life. What is urgently needed is a programme of road development which should be conceived and carried out to provide the necessary road accommodation for the present and potential traffic requirements of the country. Satisfactory roads are a public benefit to every member of the community. It is said that British industry to-day bears a dead-weight burden of fruitless transport costs, estimated by experts at from £20,000,000 to £30,000,000 annually. Inadequate roads and bridges are said to raise the cost of haulage by a percentage ranging from 15 to 50, according to the district and class of industry concerned.

Great Britain, being an intensive industrial country, ought to develop its resources to the highest extent possible, and yet it is estimated by an eminent authority that by comparison with France we have little more than half the road mileage, per 1000 inhabitants, of that country. Our primary need is for the modernization of our existing roads, so that the free and safe circulation of traffic may be assured. Bridges should be of sufficient strength and width to carry all legally authorized traffic. Road junctions should be so planned that traffic approaching from any direction may have a clear view for a reasonable distance before reaching the crossing. Sharp corners and bends should be straightened-out and eased, and the carriageway on curved sections should be banked to enable vehicles to hold their position on the road more easily when travelling at a reasonable speed. Much time is lost by motor vehicles having no alternative but to traverse roads through congested areas, and this disability should be removed by the construction of modern by-pass roads, with a carriageway never less than 36 ft. in width.

Improved road conditions would reduce the costs of transport to the great industries of this country. In too many cases, however, in connection with road work, part of the money which is being voted to relieve unemployment among our own people is being sent abroad to pay for imported materials. Road building affects all our leading basic industries, either directly or indirectly, and the man who actually lays the road is only one of many who are closely and personally interested in road expenditure.

Road Tar an All-British Product.

In road tar we have an all-British product derived from British coal whose production gives direct employment to nearly 200,000 British workpeople in the gas, coke-oven, and tar distilling industries, and indirectly as well to 800,000 miners. When, therefore, local authorities build tarred roads, it must be remembered that, not only is work being provided for their own local workpeople, but at the same time the use of local tar is giving a welcome fillip to local industry. I say, therefore, that if British industry is to derive the fullest benefit from the money which is being, and will be, spent on the road schemes of the country, it is essential that the materials used should be from first to last of British origin and of British manufacture.

The value of our product and the benefit which its extended use has conferred, and is still conferring, upon the community is, I am glad to say, becoming more and more recognized. It is only within the last few weeks that "The Times," in a leading article, stated: "Tar and its compounds, with their waterproofing and binding properties, account for the immense improvement there has been of late years in the surface of unpaved roads." To this "The Times" might have added, with every justification, that tar had rendered a further great service in providing a surface which was safe for all forms of traffic. Tar was the earliest of all modern road-surfacing materials, Great Britain being the first country to apply it to road uses; and it is interesting to note that, while in the past the use of tar has been responsible for dustless hygienic roads, it is to-day making an even more important contribution to the public welfare by providing non-slippery surfaces, and thus ensuring the safety of the road.

Many of our most important roads at this time of the year become very dangerous. They are skiddy even in summer, but during the winter, with its constant wet weather, they are for the greater part of the time almost as dangerous as ice. Properly built, tar roads are "all-weather" roads. Provided the tar is of suitable specification, provided it is covered with chippings of the correct gauge, and provided, furthermore, that these chippings are lightly rolled in immediately they are laid, the road will possess a non-skid surface, whatever the state of the weather. It is time skidding ceased to be regarded as an unavoidable inconvenience. As an industry, we have always been mindful of the importance of giving service to, and considering the needs of, the user—this consideration has been paramount in our minds since tar was first supplied in any quantity for road purposes. For the sake of their own safety, I do suggest, therefore, that users should see to it that their roads are surface-dressed with safe materials, such as tar, and so avail themselves of perhaps the most important of the services tar is able to render to the community. Point is, indeed, added to my suggestion when I say that at a time when local authorities have the greatest difficulty in balancing their budgets, they will find tar less expensive than its costly substitutes.

Association's Steady Progress.

The work which we are doing through our Association is making steady progress, and the present seems an opportune time to pass it under brief review.

On Jan. 1 of this year, after protracted consideration and negotiation, our Specifications for Tars. Nos. 1 and 2 were issued as the official British Standards. This marked a consolidation of the progress which had been made over a number of years; but before even these Standard Specifications were issued, our technical experts were engaged upon drafting a Specification for a No. 3 Tar, and this draft is now receiving the consideration of the British Engineering Standards Association. The practical utility of this No. 3 Tar is that it will facilitate quick setting, and so better enable the industry to meet continuous traffic conditions.

At the same time, we prepared draft General Directions and Specifications for the Construction and Maintenance of Roads with Tar, which have since formed the basis of discussions with the County Surveyors' Society, the Institution of Municipal and County Engineers, the Association of Tarmacadam Manufacturers, the National Federation of Granite and Roadstone Quarry Owners, and the Public Works Contractors' Association. This list of Associations is in itself some indication of the interests whose agreement has to be secured before such a draft can be officially issued by the British Engineering Standards Association, and, while I am not yet in a position to announce that agreement has been reached, it is, I think, a sign of the increasing influence of our Association that it should have devolved upon us to undertake this work, upon which we are still actively engaged.

Experimental Lengths of Road.

It will be within the recollection of all that for some considerable time we have been urging upon the Ministry of Transport the desirability of their allowing the Association to conduct an official experiment under their auspices to demonstrate the traffic bearing capacity and non-skid nature of a properly constructed tarmacadam road. It is, therefore, gratifying to report that two stretches of tarmacadam, one of slag and one of granite, have recently been laid on the Kingston By-Pass, under the auspices of the Ministry, each stretch being 220 yards in length; and we look forward with confidence to the success of these experiments. In this connection, it is also interesting to remember that a tarmacadam surfacing of a similar nature laid on the Balham High Road by the Association 2½ years ago, when replaced by a further experimental stretch early this year, had carried successfully twenty million tons of traffic.

No one can evolve a formula for the ideal road solely in the research laboratory, and the way of progress must be by practical experiment. It is, therefore, interesting to mention that in Sheffield this year over forty trial lengths were laid by members of this Association with specially prepared and blended tars.

These trial lengths cover more than eight miles of important roads, some of which carry as much as 7000 tons of traffic per day under varying conditions. Mr. W. J. Hadfield, the City Engineer and Surveyor, has already reported that, "so far as can be judged from the summer's experience, some of these special tars are much superior to the ordinary standards. Many of the trial pieces which have been subject to heavy traffic present an excellent surface, which from the point of view of safety also leaves nothing to be desired." Such experimental work is not only valuable as propaganda, but also enables us to study the behaviour of the roads under actual traffic conditions, and thus acquire invaluable data for further improvement.

There is, indeed, I think, a growing feeling among us that the conduct of such experimental work is one of the most effective uses to which the knowledge at the disposal of the Association can be placed, and it is our intention to expand this branch of our activities by availing ourselves of such facilities as, through the courtesy of the Highway Authorities, may be given us in different parts of the country.

The propagandist activities of the Association have been carried on continuously throughout the year, and, if the increasing

attention that is being paid to the claims that we make for our product can be accepted as a criterion, with no small measure of success. It is gratifying also to be able to report evidences of an appreciation of our work by those engaged in the road tar industry in other countries. The delegation from the Association which recently attended the International Road Congress at Washington has afforded further indication of the general broadening of our activities, and has given evidence of our desire to maintain and enhance in an international sphere the reputation of the product for which we stand.

I am glad to hear from the delegation which has just returned from Washington that the conference was both interesting and instructive, and that tar was kept well to the fore, and established as being of no less importance than any other alternative road-making material. The necessity for British tar representation was more than ever apparent, owing to the lack of effective advocacy from other countries.

During the year the Association, through its members, has responded generously to the appeal which, as your President, I made on behalf of the Chair of Highway Engineering. As a result of my appeal, it was a matter of personal satisfaction to me, and, I am sure, of general satisfaction to us all, that we were able to contribute, on behalf of the Road tar industry, a sum in excess of 2500 guineas, which is the largest individual contribution that has been made to the fund for its maintenance and endowment. The Paviors' Company have signified their appreciation of our action by inviting us to nominate a representative to serve on the Committee which advises on all matters in connection with the Chair, and we shall thus be able to pursue our policy of keeping abreast of every improvement and discovery which modern science may immediately and in the future apply to the technical principles of modern road construction.

Benefits to British Industry.

An attempt has been noticeable recently in certain quarters to minimize the benefit which British industry derives from the use of British tar on our roads, of which I think I should make some mention. Tar, it has been said, is a bye-product of other industries which are primarily interested in their main products, but it must not be overlooked that on those industries' ability to dispose of their tar depends, to a very appreciable extent, their ability to sell their main products at economic prices. For instance, the revenue derived from the sale of tar represents a figure of several million pounds annually to the gas industry, and the price of tar, therefore, has by no means a negligible bearing upon the price of such an essential national commodity as gas. Again, the price of tar has a very direct relation to the cost of producing metallurgical coke, and so to the cost of the production of iron and steel. It may perhaps be claimed that the mining industry is only indirectly affected; but unless our gas-works and our coke-ovens, two of the biggest users of coal in the country, can dispose not only of their main but also of their bye-products at economic prices, production must suffer, with an inevitable reduction in the amount of coal consumed.

It is gratifying to know that again this year we have been able to record a quite substantial increase in the membership of the Association, and I am sure that, with the appointment of Mr. Reginald G. Clarry as Chairman of our Managing Council, we can look forward to a year of general and increasing activity, and to a further consolidation and development of the Association's interests.

Activities Essential to the Welfare of Coal Tar.

We all hope that the coke oven industry, to whom we must look for any substantial increase of revenue in the future, will identify itself still more closely with the Association's work. Their whole-hearted support is of the greatest importance to our future progress, and with a growing realization of the potentialities of road tar, we hope that they will give full support to the Association, which has, and is, promoting the interests of that product through a difficult, if not critical, period. To those firms and undertakings that are still not subscribing to our funds, I should like to say, in concluding my address, that it is my considered opinion, when reviewing what has been achieved by this Association during the last three years, that its activities are essential to the welfare of road tar in this country, and that the amount of labour and money which has been expended has been of great benefit to the tar industry. The Association has justified our support, and I am convinced that it will continue to do so in the future.

IN CONTINENTAL COUNTRIES - - -

Abstract Translations from the Technical Press of France and Germany.

COMPARISON BETWEEN GAS-FIRED WATER HEATERS OF THE GEYSER AND STORAGE TYPES.

W. Marx, "Das Gas- und Wasserfach," 1930, **73**, 992-998 (Oct. 18), considers the question of water heaters. In connection with the economical running of circulating systems, heat losses by radiation and convection are first discussed. These losses are independent of the nature of the fuel. In the case of a water circulator of maximum working output equivalent to 43,200 B.Th.U. per hour, the water being heated to and maintained at a temperature of 158° Fahr. with a 45-gallon tank and with a length of 17 ft. of 1½-in. piping, the heat losses are as follows:

Circulator (10 p.ct. of the output)	= 4,320 B.Th.U. per hour
Piping, moderately well insulated	= 880 " " "
Tank	= 2,230 " " "
	7,430
	= 178,320 B.Th.U. per day

In an installation in which the water in the distribution system is continuously circulated with the object of ensuring that hot water is delivered as soon as a tap is turned on, and with distribution pipes 1 in. in diameter and 130 ft. long, a further heat loss of 2980 B.Th.U. per hour or 35,760 B.Th.U. per 12 hours may occur.

A further source of heat loss independent of the nature of the fuel is the loss due to cooling-off of the water in the distribution pipes in the intervals between the use of hot water from the taps. This cannot be avoided, but can be minimized by reducing, as much as possible, the length of the piping. It is not always best to place the circulator close to the tap consuming the greatest amount of hot water—that is, in the case of a house, near the bath tap, since the latter is used very much less frequently than is the kitchen tap. In the case of a 33 ft. length of ¾-in. pipe between the circulator and the tap, each time the water in the pipe is allowed to cool from 104° to 68° Fahr., there will be a loss of 264 B.Th.U., or, if this occurs twenty times a day, of 5280 B.Th.U. per day or 158,400 B.Th.U. per month. If there are some taps far removed from the rest of the system, the most economical procedure is to separate these from the central supply system and to equip them with individual heating supplies. The fact that gas, though offering many advantages, is a dear fuel necessitates cutting-down heat losses to a minimum.

If stress is not laid on the continuous availability of hot water in the tank, and the gas is turned off at night, the above heat loss of 178,320 B.Th.U. per day is halved, but approximately 26,400 B.Th.U. will be required in the morning to raise the temperature of the water in the tank from 104° to 158° Fahr. The heat saved is thus 62,760 B.Th.U. per day or 1,882,800 B.Th.U. per month, representing a saving of approximately 5000 c.ft. of gas [net C.V. = 450 B.Th.U. per c.ft.] per month (assuming an efficiency of 85 p.ct.), equivalent to £1 0s. 10d. per month with gas at 4s. 2d. per 1000 c.ft. The unavoidable heat loss must be minimized by making the tank no larger than necessary and by making the whole installation as compact as possible.

The heat lost in connection with the luxury of instantaneous availability of hot water from all the taps, 35,760 B.Th.U. per day of 12 hours, is equivalent to 2800 c.ft. of gas per month, representing 11s. 8d. per month, and will be greater if, as is generally the case, the distribution system is not well lagged.

In connection with water heaters, no revolutionary ideas are to be expected as regards design. The efficiency nowadays attained is 85 p.ct., and though it would not be difficult to increase this figure, it is not advisable to do so, as difficulties would arise in connection with the certainty of safe evacuation of the products of combustion. So many designs of heater are available that a choice of the most suitable appliance for a specified purpose is not always easy. Fundamentally, all the heaters work either on the geyser or on the storage principle. Even the choice between these types presents difficulties, and these are magnified when the finer differences between individual models have to be assessed. Geysers warm the water during its passage through the appliance, whereas storage heaters warm their content of water to a temperature automatically regulated to the desired value by means of a thermostatic

control. On this difference depend the different applications of the two types of heaters In storage heaters, the heating operation requires a definite time and the burners are, therefore, for an equivalent rating, appreciably smaller than in geysers, which latter must be able to give a large output in a short period of time. Hence a storage heater can be coupled to a small supply pipe, an important consideration when the question arises of effecting economies in the installation of a heater in an old house having narrow pipes. Nevertheless, the fact that storage heaters require a definite time to reach working temperature sometimes weighs the balance in favour of geysers in cases in which hot water must always be available and the cost of the gas involved in maintaining a store of hot water will not be faced. On the other hand, where a sudden demand for large quantities of hot water may arise, the geyser would have to be so large that a storage heater coupled to a tank would be preferable.

In order to compare the two systems, it is necessary to investigate the heat losses associated with normal working. Storage heaters fitted to a single tap have as their only source of heat loss radiation from the body of the apparatus, and this is minimized by a polished nickel-plated finish. In collaboration with Herr Brümmerhoff, the performances of a geyser (output 700 B.Th.U. per min.) and a storage heater (2¾ gallons capacity) were compared over a period of 10 hours under like conditions as regards the quantity and temperature (140° Fahr.) of the water drawn off and the times at which, and the periods over which, the water was withdrawn. Water was withdrawn both at frequent intervals and at long intervals (eleven times in all) as would be the case under normal conditions of use. The results are shown in tables and in charts.

In the case of the storage heater, with frequent withdrawals of warm water the pauses do not quite suffice to restore the contents to the working temperature, and at each successive withdrawal the temperature of the water is less. Withdrawal of a large quantity showed, as is well known, that only about two-thirds of the contents can be run off at a steady temperature. The geyser comes up to temperature more quickly the more frequently it is used. Nevertheless, even when a relatively long idle period elapses, heating is not as slow as with the completely cold apparatus, since the pilot flame serves to cut down the cooling rate to a very slow value. With frequent withdrawals of water, the initial temperature of the issuing water after a pause is higher than it was at the end of the previous withdrawal, due to after-heating of the water in the tubes by the heat contained in the metal-work. This is the direct opposite of what occurs with the storage heater.

The investigation showed efficiencies of 52·9 p.ct. and 67·7 p.ct. respectively for the storage heater and geyser for approximately equal amounts of heat (8500 B.Th.U.) in the hot water withdrawn during the test. This difference was not unexpected, in view of the radiation losses involved in keeping the contents of the storage heater warm. The efficiencies of the appliances themselves were 85 p.ct. and 89 p.ct. respectively, the decrease under working conditions being due, in the case of the storage heater, principally to the heat required to keep the contents hot, and in the case of the geyser to the pilot flame and to the heat put into the metal-work at each withdrawal, which heat is lost to a greater or lesser extent depending on the interval between withdrawals.

From the tests, the conclusion is drawn that the geyser offers progressively greater advantages as the quantity of water withdrawn at each tapping increases.

Each type of heater is adapted to economy in its use. In the case of the geyser this is effected by turning off the gas before the water is shut off, and making use of the issuing water till it ceases to run lukewarm. The pilot flame kept the water in the geyser at a temperature of 86° Fahr., and, in starting up, the heat content (above 86° Fahr.) of the water withdrawn before the working temperature of 140° Fahr. was reached was equivalent to 180 B.Th.U. Similarly, when the gas was turned off 192 B.Th.U. (above 86° Fahr.) were contained in the water which continued to flow out before its temperature had fallen to 86° Fahr. This lukewarm water may be used. In the case of the storage heater, economy is effected by turning off the burners (but not the pilot flame) during relatively long periods of disuse—*e.g.*, between breakfast and lunch (say) for 3¾ hours. The gas required to maintain the temperature of the water at 140° Fahr. was 1·7 c.ft. per hour; hence the saving during this period, in which the temperature fell to 110° Fahr., was 6·3 c.ft. After the break, the quantity of gas required to restore the temperature to 140° Fahr. was 3·8 c.ft., the net saving being thus 2·5 c.ft. When this saving is effected daily, it represents 75 c.ft. of gas saved per month.

The same general considerations apply in the case of larger installations.

In the case of the two appliances tested, the storage heater could deliver 1½ gallons of water in 50 seconds, whereas the geyser required 100 seconds for this quantity. There are many circumstances under which this extra speed would be so desirable that the choice would fall on a storage heater in spite of the greater cost. On the other hand, the unavoidable period required for heating up a storage heater would in some cases make the selection of a geyser necessary.

PREPARATION OF AMMONIUM SULPHATE AND NITROGEN.

In the "JOURNAL" for Aug. 27 last, p. 478, reference was made to the catalytic oxidation of ammonium sulphite in aqueous solution by atmospheric oxygen in presence of a cobalt catalyst (sulphito-ammine-cobalt). Ammonium sulphate and nitrogen are thereby formed. Further details are given in an abstract in "Brennstoff-Chemie," 1930, **11**, 441 (Nov. 1), of a paper by D. Vorländer and A. Lainau which appeared in "Ztschr. für angew. Chemie," 1930, **43**, 647-8.

An ammoniacal aqueous solution of ammonium sulphite containing $6 - 60 \times 10^{-5}$ gramme atoms of cobalt per litre at 15°-25° C. absorbs atmospheric oxygen as quickly as does phosphorus or alkaline pyrogallol solution. The speed of absorption of oxygen increases to a value measurable only with great difficulty as the concentration of the cobalt increases. The complex cobalt compound is very stable towards oxygen and sulphur dioxide and is only active in presence of a mixture of ammonium sulphite, ammonia, and oxygen. The optimum concentration of ammonia is at a hydrogen ion concentration equivalent to a p_H of 8·4 to 8·6, independent of the concentration and nature of the catalyst. At 18°-19° C., the maximum concentration of ammonium sulphite is 70 grammes of the monohydrate per litre. Above this, absorption of oxygen is less rapid.

Attempts to increase the catalytic action by addition of other materials were unsuccessful. The separation of the catalyst from the product is not difficult, since it remains in the mother liquor from the crystallization of the ammonium sulphate, and re-crystallization of the latter removes the last traces. Plant culture experiments with ammonium sulphate containing 0·01-1 p.ct. of cobalt showed that small quantities of cobalt do not have a deleterious effect on plant growth.

It is to be noted, in connection with the foregoing, that, as recently as this year, Mellor, in Vol. 10 of his "Comprehensive Treatise on Inorganic Chemistry," was able to make the statement that no catalyst for the air oxidation of ammonium sulphite was known.

DETERMINATION OF MOISTURE IN SOLID FUELS.

A new method for the determination of moisture in solid fuels is described by M. Dolch, "Brennstoff-Chemie," 1930, **11**, 429-435 (Nov. 1). The ordinary method of determining moisture at 105° C. or thereabouts does not give accurate results, and the xylole distillation method, also, gives low results and cannot be regarded as a standard method for technical or scientific purposes. The new method described by the author is stated to give accurate results, and a determination can be made in 12 minutes.

The method depends on the extraction of the water from the fuel by use of alcohol, and a determination of the extracted water by observation of the critical solution temperature (turbidity temperature) of the alcohol-water mixture and an equal volume of petroleum ether. An increase of 1 p.ct. in the water content of alcohol raises the turbidity point by at least 10° C.

The apparatus (obtainable from F. Hugershoff, Leipzig, C.1) consists of a 6 in. by 1¼ in. test-tube surrounded by a jacket as in a Dewar flask and provided with a ground-in thermometer (− 10° to + 50° C. in $\frac{1}{10}$'s) and a stirrer of nickel wire. The turbidity point is determined in this apparatus after the fuel has been treated with alcohol in a 300 ml. Erlenmeyer flask provided with a ground-in air condenser 70 cm. long.

A calibration curve is first constructed for the petroleum ether and absolute alcohol employed. Large quantities of the liquids are kept available so that a calibration need be made only at long intervals. 50 litres of petroleum ether [11 gallons] suffice for 2500 determinations. Into a weighed 100 ml. flask provided with a ground-glass stopper is pipetted 50 ml. of the alcohol. The flask is re-weighed, and weighed again after addition of 5 drops of distilled water. Of the solution, the water content of which is thus accurately known, 20 ml. is pipetted into the apparatus, followed by exactly 20 ml. of the petroleum ether. The turbidity point is then ascertained. The determination is repeated with increasing quantities of water. In the case of the lower percentages of water, cooling below room temperature is necessary; and, with a high water content, warming is necessary. The temperature range of the turbidity points is from 0°-50° C. approximately with concentrations of water ranging from 0·5-4·5 p.ct. in the alcohol. Instead of the costly pure alcohol, an absolute spirit denaturated with petroleum ether can be obtained and may be used.

For the determination proper, 5-20 grammes of the fuel, depending on the moisture content, is weighed into the Erlenmeyer flask. The quantity required is 20, 10, or 5 grammes, according as the moisture content of the fuel is 0-10 p.ct., 10-30 p.ct., or above 30 p.ct. The particle size of the fuel should not exceed ⅛ in., but fine grinding is unnecessary. The flask and its contents are weighed, and 100 grammes of alcohol is weighed in (to the nearest $\frac{1}{10}$ gramme). The condenser is inserted, and the contents of the flask are raised to the boil, maintained in quiet ebullition for 5 minutes, cooled, and quickly filtered through a dry paper. The first runnings are discarded, and 20 ml. of the later fraction is pipetted into the turbidity point apparatus.

A German Breakdown Van

The Berlin Municipal Gas-Works have introduced a new type of breakdown van for use during gas-pipe fractures, and so on. Our picture shows a view of one of these novel municipal breakdown motor vans, which are equipped with every modern apparatus. These vans, like the fire brigades, will have the preference of the road.

INCOME-TAX CASE AT ALLOA - - -

Claim for Deduction of Sums paid from profits for Electricity Losses in Computing Valuation for Income-Tax.

An important principle is involved in a claim by the Alloa Gas Department for deduction of sums paid from profits for electricity losses, in computing valuation for income-tax; and we therefore summarize below the main facts of the case, which has its origin in a condition of affairs that has from time to time been criticized in the pages of the "JOURNAL." The appeal to the Special Commissioners having been decided against the Town Council, the matter is being taken to the Court of Session.

At Alloa both gas and electricity supplies are in the hands of the Town Council. The financial results accruing from the operation of the Electricity Department have been disappointing, and, partly as a consequence of heavy capital expenditure on plant installed for the purpose of meeting the heavy demands of the Forth Shipbuilding and Engineering Company, Ltd., for electrical power, which did not become fully remunerative before the works were closed down in 1923, it was necessary to liquidate these adverse balances.

For this purpose, recourse was had to section 7 of the Electric Lighting Act, 1882, as amended by the Schedule to the Electric Lighting (Scotland) Act, 1890. The former enactment provides that any expenses incurred by a local authority in respect of the electricity undertaking may be defrayed out of the local rate, while the schedule has the effect of bringing within the definition—in the case of Alloa—the gas rates and rents, &c., receivable under the provisions of the Burghs Gas Supply (Scotland) Act, 1876. Accordingly, in each of the four years ended May 15, 1927, a sum of £5000 was transferred from the funds of the Gas Department to the credit of the Electricity Department—being shown in the respective Net Revenue Accounts. As from Jan. 1, 1927, however, the Scottish Central Power Company assumed control of the electricity undertaking; the purchase price agreed upon being insufficient to meet the liabilities at that date—which by the Deed of Transfer were to be borne by the Town Council—as well as the huge deficit of some £37,000 which had accumulated during the 27 years' existence of the Department. During the two years ended May 15, 1929, a further £11,650 has been surrendered by the Gas Department to meet the interest on the mortgage debt of the Electricity Department and to assist in reducing the accumulated deficit.

In order to meet the liability placed upon the Gas Department to provide an annual sum in excess of the immediate revenue requirements of the undertaking, it was necessary first to determine a rate per 1000 c.ft. which would cover normal working expenses, and then for the Gas Committee to make such addition thereto as was estimated would produce the required sum per annum.

This additional charge for gas supplied was fixed at 7d. per 1000 c.ft., but owing to unforeseen circumstances (including a fall in the price realized for residuals, with a consequent increase in working costs) this was rarely sufficient to produce the requisite amount, and, in most years, a trading profit was transformed into an apparent loss. Instead, therefore, of being in a position to diminish the deficit of the Gas Department, a further loss was incurred; and this figure has increased by over £1000.

Thus far, the financial aspect only has been dealt with; of equal importance, and the main subject of these notes, is the position of the Gas Department in respect of these profits for income-tax purposes. The Town Council contend that so much of the profits earned by the Gas Department as were, in fact, transferred to the funds of the Electricity Department should not be regarded as taxable income in the hands of the Gas Undertaking—that is, that the annual sums specifically raised for this purpose should be allowed as a deduction in the computation of profits.

The Inspector of Taxes held the opposite view, and the case was referred, by the Town Council, to the Special Commissioners, and was duly heard in Edinburgh on July 4 last. The Alloa Town Council was represented by Counsel, and the Inspector appeared on behalf of the Inland Revenue.

After a lengthy hearing the Special Commissioners gave their decision in favour of the Crown on the grounds that the annual payments to the Electricity Department were neither sums paid for the purpose of earning profits, nor a legal rate or charge incidental to the undertaking. The Town Council expressed dissatisfaction with this ruling on a question of law, and the appeal will shortly come before the Scottish Court of Session.

ARGUMENTS ADDUCED.

Counsel submitted that the Burgh was in effect levying what might be termed an "electricity rate," in addition to the ordinary gas charges, on the gas consumers; and that accordingly the receipts from the former compulsory rate were in no sense part of the profits or gains of the Gas Department for income-tax purposes. In support of this submission, the Glasgow

Water Works (1875) case was quoted. He contended that the levying of this special rate was authorized under the provisions of section 38 of the Burgh Gas Supply (Scotland) Act, 1876—as amended by the Burgh Gas Supply (Scotland) Amending Act, 1918—in the form of a "Gas Contingent Guarantee Rate" which was imposed only on occupiers and irrespective of the quantity of gas consumed (in which respects only it differs from the gas rate or charge for supplies), and was brought into operation when the raising of the price of gas to an uneconomic level would have the effect of bringing about a reduction in the total consumption of gas.

Counsel further contended that the case of *Mullingar District Council v. Rowles* (1913)—which the Inspector of Taxes cited as authority for taxing the receipts from the supply of water, even where the basis of charge was not on the consumption but on a valuation—was not relevant, as it decided merely that a water undertaking might show a taxable profit.

The Inspector pointed out to the Special Commissioners that the Gas Department had not claimed that the £5000, transferred each year to the credit of the Electricity Department, was an admitted debit, but had claimed that it was not a taxable credit. He suggested that an appeal could be successful only if both points could be proved to the satisfaction of the Special Commissioners. Proceeding to disprove both these claims, the Inspector referred to *In re Glasgow Gas Commissioners* (1876), as justifying the assessments made on the Alloa Gas Department, and quoted *Mersey Docks v. Lucas* (1883), as rendering it unnecessary to consider the purpose for which part of the total receipts was specifically raised or the appropriation or destination of such receipts above the expenses.

On behalf of the Inland Revenue the Inspector particularly stressed the fact that the Gas Department could do no more than estimate the result of the additional charge levied on the consumers; also, that in only one of four consecutive years under review were the profits of the Gas Undertaking sufficient to leave a surplus after providing the agreed transfer of £5000. This was admitted to be a direct result not only of the reduction in the realized price of bye-products, but partly due to the Coal Stoppage of 1926, which had upset all financial budgetting.

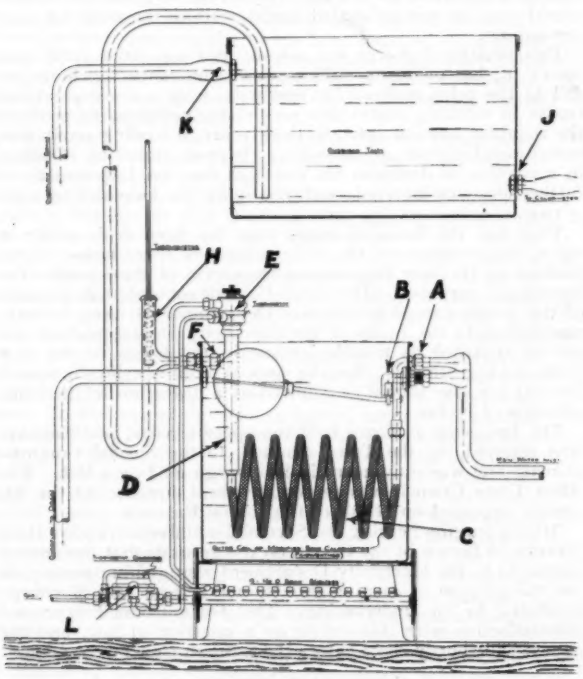
On this point, the Gas Engineer and Manager (Mr. J. W. Napier) gave evidence to the effect that the additional charge of 7d. per 1000 c.ft. had been decided upon having in view their experience that the yield of 1d. per 1000 c.ft. was approximately £800 per annum.

The Inspector, while prepared to agree that a Gas Contingent Guarantee Rate, raised in pursuance of the Acts of 1876 and 1918, for the purpose of meeting the liability thrown upon the Gas Department by the Electric Lighting (Scotland) Act, 1890, would not be assessable to income-tax, argued that the £5000 was not raised thereby but out of the price charged for gas, and that it would have been illegal to levy the rate, as suggested, on a certain section of the ratepayers (*i.e.*, gas consumers) only, on a consumption basis. In refuting this argument the Burgh of Alloa were apparently at a disadvantage in view of the fact that evidence was submitted by the Inspector of Taxes showing that the Town Clerk had advised the Secretary of State for Scotland that it was not proposed to levy a rate under the 1876 Act.

Device for Heating the Water Supplied to a Boys Calorimeter.

Mr. W. H. B. Hall, B.Sc., of the Chemical Department of the South Metropolitan Gas Company, describes the apparatus used by that Company to satisfy the conditions of the Gas Referees' Notification.

The Gas Referees require that the water supplied to a Boys calorimeter, used for official testings, shall be colder than the room by not more than 5° C. Since the temperature of all properly fitted calorimeter rooms is maintained constant by means of thermostatically controlled heating appliances, it is only necessary to install some device for maintaining the water at a predetermined constant temperature in order to comply with the Gas Referees' instructions. Such a device has been designed by the Technical Staff of the South Metropolitan Gas Company, and is employed in their testing places.



The device is shown in the diagram, and consists of a copper water bath in which a copper coil (C) is immersed. One end of the coil is connected to the ordinary water supply at (A); the other is brazed to a copper sheath (D) into which a thermostat is screwed so that the sensitive element reaches the bottom of the sheath. A union (F) is fixed in the side of the sheath to connect with the pipe rising to the 5-gallon overhead tank. It is convenient to have a thermometer placed in a pocket immersed in the water leaving the heater, as shown at (H). The water to be supplied to the calorimeter passes through the coil (C) where it is heated by conduction from the water in the bath. It passes over the sensitive element of the thermostat (E), and its temperature can, if required, be measured by the thermometer at (H). The water is then carried to the small overhead tank which is fitted with an outlet (J) leading to the calorimeter; an overflow pipe (K) carries excess water to a sink. The waterflow is adjusted by means of the main tap so that there is always an overflow from the outlet (K), and the rate of flow of water through the calorimeter is controlled by means of a small quadrant cock with scale near the calorimeter on the pipe leading from the outlet (J). The overhead tank thus serves as a constant level tank, and the small overflow funnel customarily used with a Boys calorimeter can be dispensed with. This, however, is not the primary object of the tank. When the thermostat operates there is momentarily a small fluctuation in the temperature of the water leaving the coil, and the tank serves to even-out these fluctuations so that they are not indicated by the inlet thermometer of the calorimeter. The tank is also necessary since, if the water is heated and passed direct to the calorimeter, the air driven out of solution will cause air-locking in the calorimeter, with a consequent variable outlet temperature. The insertion of the tank allows the air no longer in solution to escape to the atmosphere. The water level in the bath containing the coil is maintained by means of an ordinary ball valve, and an overflow to sink is fitted.

The temperature of the water leaving the coil is maintained constant by the "Perfecta" thermostat (E), which controls the "Perfecta" thermostat governor (L). This combination regulates the gas consumption of the luminous flames (13 Bray burners No. 0.) heating the bath through which the calorimeter water is flowing.

When the thermostat (E) is placed in the position shown it will act as an automatic gas cut-off in case the water supply fails, since, if no water flows through the coil, the sensitive element will take up the temperature of the water in the bath and automatically cut off the gas when this temperature rises to about room temperature. The thermostat governor (L) is provided

with a small setting screw to prevent the valve pressing tight down on to its seating when it is not desirable that the gas supply be completely cut off, as is the case when the appliance is used on a gas fire; but when used on the water heater this screw should be placed so that it is inoperative, as it is essential to the proper working of this apparatus that the gas flames should be capable of extinction. Experience has shown that the governor works best for the purposes under consideration when the gas supply is governed to about 2½ in. of water pressure. The apparatus will maintain the water supplied to the calorimeter constant to within ± 1° Fahr., and is large enough to supply two or three calorimeters.

The "Perfecta" thermostat and governor is a stock article supplied by Messrs. Cookers & Geysers, Ltd., 244, High Holborn, E.C. 1, and the coil used is the outer coil of a Fairweather calorimeter, with the usual copper wire spirals affixed to facilitate the conduction of heat from the bath to the interior of the coil, and was supplied by Messrs. Scientific & Projections, Ltd. The remainder of the apparatus is simple to make and assemble.

PAISLEY'S NEW SHOWROOMS

"Keep your eye on Paisley" was a famous politician's utterance that is often quoted to-day. The recent opening of new Gas Showrooms in the town of thread and cotton gives the inhabitants the opportunity of keeping their eyes on what the Gas Department has to offer in the latest appliances for cooking, heating, and lighting.

All the cookers displayed are fully-enamelled and fitted with thermostatic oven control, while chromium plating with its untarnishing qualities is much in evidence. At the extreme end of the showroom a recess has been formed and fitted up as a demonstration bathroom; the walls and surround of the bath being panelled in Marbleite of a rose tint. Water heaters of several types have been fitted to the pedestal basin and bath, and connections left so that these can be changed easily and at will.

That gas lighting is still the illuminant of the future is indicated by the display of modern fittings shown. These comprise examples of wall panel fittings, candle sconces, floor standards, window spot lights, and pendants. The majority are fitted with distant controls and can be operated by the flick of a finger. The floor covering of this room is dark wedgwood blue with fawn Indian carpets.

Situated in Moss Street, near County Square, the new Showrooms are right in the heart of the shopping centre of the town, and make a notable addition to the many fine premises in the vicinity.

The front, which has been designed on modern lines, is finished in emerald pearl granite, Roman stone, and bronze metal, and the windows are so arranged that the whole interior of the main showroom can be seen from outside. This combination, as might be expected, has resulted in a most attractive setting for the display of gas appliances, the light colour of the Roman stone framing the window and throwing it into bold relief against the dark weather-beaten stonework of the surrounding buildings.

On entering, one is immediately impressed by the dignity and harmony of the interior. There is no overcrowding. The walls of the showroom have been panelled in mahogany with white frieze and ceiling. Two mahogany mantelpieces with tile surrounds and raised hearths are situated one on either side of the showroom, and are complete with gas fires of pleasing designs.

A doorway is provided at the rear to permit of apparatus being removed without passing through the showroom entrance.

Upstairs there is a spacious salon on somewhat similar lines to the main showroom. Four fireplaces are shown; three are in mahogany, while the fourth is a tile unit specially made for bedrooms. All of these are fitted with raised hearths which eliminate the necessity for a kerb.

Several examples of fully-enamelled cookers and wash-boilers are displayed here, and hidden connections have been fitted so that the appliances can be shown in operation if necessary. The latest designs in candle and panel lighting fittings are also on view. On this floor also is situated the office of Mr. Catterson, the Distribution Superintendent of the Gas Department, who is in charge.

Mr. Nesbit, the Engineer, and the officials of the Gas Department are to be congratulated on their enterprise, which is certain to develop the sale of gas appliances in their area of supply.

RECENT FUEL RESEARCH PUBLICATIONS

"Measurement of a Rapidly Fluctuating Flow of Gas."*

Technical Paper No. 27 describes an apparatus, evolved at the Fuel Research Station, with which it is possible not only to measure and record the total volume of gas made during normal water gas practice, but also to determine the amount of gas made in each cycle or part thereof. The method involves the continuous reproduction on a clockwork driven photographic roll of the meniscus of a moving liquid in an inclined gauge, the ends of the gauge being connected to the gas main on either side of an inserted orifice plate.

An investigation of methods of the exact measurement of the air supplied during the blow period of the water gas process by means of the orifice-plate and Pitot-tube was also carried out, and it is shown in the report that the orifice plate method, though not necessarily more accurate, is more practicable for this type of gas flow measurement.

These methods have been evolved in connection with extended research on the water gas process at the Fuel Research Station, and are to be employed throughout future investigations.

Though the photographic method of recording variable gas flow is not likely to spread in industrial processes, there is little doubt that its use will prove invaluable in particular instances and for special investigations of reactions of special types such as is undoubtedly experienced in the study of the water gas process.

TAMBT.

* Department of Scientific and Industrial Research—Fuel Research Technical Paper No. 27. By Drs. J. G. King and B. H. Williams. London: H.M. Stationery Office, 1930. Pp. VI. + 18; price 6d. net.

The Correlation of Coal Seams.*

The story of the investigations into the constitution of coal from the point of view of paleontology is a very fascinating one. Gradually the microscope is revealing differences in the structures of the vegetable bodies which have been crushed together in the coal mass, differences which are proving to be sufficiently susceptible to classification to provide means for the identification of coal seams. We do not recollect having read a more admirable piece of work than that reported in the paper before us, nor one in which scientific method is applied in a more engaging form—engaging, that is, to those interested in coal, because the mass of information here collected and presented is by no means easy of digestion. If these methods should prove to be practicable they will form an extremely interesting example of the assistance which can be rendered by one branch of science, in this case paleobotany, to the solution of an important problem in another—viz., the classification of coal seams.

In this report an account is given of an investigation of a means of correlation employing evidence that is furnished by the contents of the actual seams of coal, as against the usual methods depending upon the recognition of fossils in the associated coal-measure strata.

The method employed—a modification of that first employed by Dr. Thiessen in America—entails the preparation and the microscopical examination of a complete series of thin sections cut from a pillar of coal representing the seam from floor to roof. The spores, or rather the spore exines or skins are identified, classified according to size, shape, and ornamentation, and their frequency of occurrence is recorded. Up to the present, this means of investigation has been fully applied to the Parkgate Seam in the South Yorkshire Area; but it is realized that before it can be established as a reliable means of identification of coal seams, the method must be applied to several seams over an extended area. The work is accordingly being continued on the Barnsley and other seams in the same area.

The report gives a brief but interesting and comprehensive description of the two chief divisions of spores—*i.e.*, the larger megaspores (female), and the smaller microspores (male), with speculations as to their development and their functions in the reproductive organization of the coal-measure plants.

The amateur who has laboriously prepared one or two coal sections and examined them under the microscope at a magnification of 50 or 100, becomes wildly enthusiastic if his sections show several of these spore exines looking (in section) like the half of an orange which has been doubled and squeezed flat until all the juice and pulp has been extruded, leaving to view only the skin edges closed together like a pair of lips.

It is rather novel to realize that just as oranges may vary considerably in size and even more so in the thickness of the skin, so do these spore cuticles vary—but to a considerably larger extent. Further, the latter show even more identifiable variation in that the outer walls of the spores in many cases were originally ornamented by outgrowths of spines, wings, or tubercles. These have been preserved in the coal; and as they show considerable variation in type, size, and concentration, they serve a useful purpose in the identification of types of spores.

The report shows an ingenious method of graphically representing the distribution of spores in the sections; gives in the appendix a brief and useful description of the detailed method for the preparation of the thin microscopical coal sections; and finishes with a series of splendid plates reproducing actual microphotographs and line drawings of each type of the megaspores and microspores identified and described in the text.

The whole of the report is a good example of a truly scientific piece of investigation in an unusually well produced and readable form.

TAMBT.

* Department of Scientific and Industrial Research, Fuel Research—Physical and Chemical Survey of the National Coal Resources No. 17. "The Significance of Spores in the Correlation of Coal Seams. Part I. The Parkgate Seam—S. Yorks. Area," by Dr. L. Slater, Marjorie M. Evans, and Gladys E. Eddy. H.M. Stationery Office, Adastral House, Kingsway, W.C. 2. 1930; Pp. VI. + 28 and plates; price, 1s. 3d. net.

"Determination of Aromatic, Unsaturated, and Naphthene Hydrocarbons in Light Oils and Motor Spirits."*

Just as Nature abhors a vacuum so is humanity apparently impelled to strive to elucidate every one of the hidden mysteries of Nature. Little by little is coal being resolved into its constituents, and the latter are being identified, recorded, and classified so as to serve their purpose in the ultimate solution of the question of the composition of coal.

One of the tracks through which this process is being achieved is by the carbonization of coal and the identification of the resulting products. Tar, the most interesting and most elusive of the products of carbonization, provides a vast field of investigation on which a large number of scientists are engaged. Although the large majority of the vast number of compounds present in coal tars have been isolated or at least identified in the mixtures, there is still considerable difficulty in the analysis of tar and the establishment of the types and proportions of the constituents which determine the relative properties of different tars and tar products.

In this connection the Director and staff of H.M. Fuel Research Station are to be congratulated on having evolved a fairly rapid and convenient method for the analysis of light oils and motor spirit, involving the separate determination of the aromatic, unsaturated, naphthene, and paraffin hydrocarbons in the mixtures.

It is evident that this determination is not only of extreme scientific importance in the investigation of the tars produced in the carbonization of coal at different temperatures and in different types of carbonizing plant, but should prove invaluable in the industrial control of motor spirits and light fuel oils in general.

The method, which is a chemical one, involves the separation and weighing of definite derivatives of the aromatic and naphthene hydrocarbons; and it is satisfactory to note that the apparatus and method of procedure adopted is of the simplest type and free from the elaborations often introduced by investigators who lose sight of the moderate degree of accuracy which is sufficient in determinations of the constituents of such variable mixtures as those under investigation.

The all too brief report shows, as an indication of the application of the method, the results of the analysis of several synthetic mixtures of hydrocarbons as well as samples of the crude and refined light oils from the carbonization of coal at 625° C., a sample of power petrol and a sample of the light oil obtained from the hydrogenation ("berginization") of coal. It is rather a pity that there are not included, in addition, for comparative purposes, samples of the light oils from at least one typical high-temperature tar and from a selection of two or three typical and widely varying systems of carbonization.

TAMBT.

* Department of Scientific and Industrial Research—Fuel Research Technical Paper No. 28. By Dr. A. B. Manning and F. M. E. Shepherd. London: H.M. Stationery Office, 1930. Pp. IV. + 14; price 4d. net.

THE "JOURNAL" TECHNICAL RECORD

Which also contains Full Reports of Meetings of Gas and Allied Associations ———

Midland Association of Gas Engineers and Managers

Lecture by Mr. H. C. Widlake on Electrical Fusion of Gas Pipes

The Autumn General Meeting of the Midland Association of Gas Engineers and Managers was held at the Grand Hotel, Birmingham, on Thursday, Nov. 6—Mr. A. BIRD (Bromsgrove), the President, in the chair.

Prior to the ordinary business, the PRESIDENT said that since their last meeting they had lost by death Mr. Samuel Glover, of St. Helens, and Mr. H. Haddock, of Atherstone. Both of them had been members of the Association for over 25 years. They were always delighted to see Mr. Glover, who was a most lovable man. He had done a tremendous amount of work which had been of great benefit to the gas industry. Mr. Haddock had also been a most regular attendant at the meetings of the Association.

Members stood in silence as a mark of respect.

ELECTION OF HON. MEMBER.

The Committee recommended the election of Mr. John A. Harris, late Manager and Secretary of the Great Wigston Gas Company, to the class of Hon. Member.

The PRESIDENT said there were only about two older members than Mr. Harris. He had been a regular attendant at the meetings until the last twelve months or so; and he (the President) had great pleasure in proposing that he be elected an Hon. Member.

Mr. F. J. WARD (Dorridge) seconded, and the resolution was carried unanimously.

The PRESIDENT said that the next business was the presentation of certificates to nine successful students in the Higher Grade Examinations in Gas Engineering and Gas Supply. They were very pleased to see so many young men progressing. They hoped that in future there would be more, and that some of them would occupy the chair of the Association.

The certificates were presented as follows: First Class, Gas Engineering, Mr. K. E. Tiddy (Hinckley), and Mr. C. R. E. Turner (Birmingham).

Second Class Gas Engineering, Mr. C. J. F. Truslove (Birmingham), Mr. W. R. D. Tildesley (Tamworth), and Mr. C. H. Underhill (Burton-on-Trent).

Second Class Gas Supply, Mr. F. A. Grant (Birmingham), Mr. H. J. King (Birmingham), Mr. R. Mackenzie (Birmingham), and Mr. N. P. Maskell (Birmingham).

Mr. Herbert J. White, Manager and Secretary, Gas-Works, Church Stretton, was elected a member of the Association.

NEW PRESIDENT.

The Committee recommended Mr. H. J. Woodfine, of Wellington, as President for the ensuing year.

The PRESIDENT remarked that he was sure Mr. Woodfine would make an excellent President.

Mr. WOODFINE, in returning thanks for his election, said they might depend upon it that he would devote his best efforts to maintaining the dignity of the Chairman and the prestige of the Association.

The PRESIDENT said it was with great pleasure that the Committee recommended the election of Mr. E. B. Tomlinson, of Birmingham, as Vice-President. It was some years since they had had a representative from Birmingham as President.

The following were elected to the Committee: Messrs. S. Sadler (Solihull), W. Wilson (Burton-on-Trent), and P. Dougall (Kidderminster).

Mr. C. Dakin (Cradley Heath) and Mr. R. J. Meiklejohn (Rugby) were elected Auditors, and Mr. Arthur Roberts was re-elected Hon. Secretary.

MR. WIDLAKE LECTURES.

Mr. H. C. WIDLAKE, A.M.I.E.E., Chartered Electrical Engineer, of the Plymouth and Stonehouse Gas Light and Coke Company, then delivered a lecture upon the electrical fusion of gas pipes, a subject to which the attention of gas engineers generally is becoming somewhat seriously directed. Mr. Widlake stated that when an electrical fault was responsible for the puncturing of a gas conduit, and the subsequent ignition of the escaping gas, it did not occur to the public generally to attach the responsibility for the mishap to the electric current, but rather to blame the gas for the ensuing damage.

There was no doubt that, under certain conditions, the dual use of gas and electricity by the same household might result in the creation of a dangerous state of affairs, and it was equally certain that, if gasfitters were trained to identify those conditions, much would be done to eliminate the risk of fire. The vague order which warned gasfitters against allowing gas pipes and electrical conduits to touch each other, and instructed them to fit spacing pieces of insulating material, was all right as far as it went, but it was desirable that it should be supplemented by knowledge on the fitters' part as to what constituted a dangerous state of affairs.

Mr. Widlake then cited a typical case of electric fusion of a gas pipe.

An engineer is advised of a leak in a certain house in which a fire may, or may not, have occurred. Upon investigation it is found that an iron or compo pipe lying in close proximity to a lead sheathed cable or an electric conduit has been perforated, the appearance of the pipe suggesting the application of an acetylene torch. A corresponding perforation is generally noted on the adjacent lead sheathed cable or conduit, and it is obvious that the two services have been in contact and that a heavy current has passed across the point of such contact. The obvious step to take is to restore the gas service by replacing the damaged pipe, but it then becomes necessary to investigate the conditions which make it possible for a short-circuiting electric current to seek a path to earth via the gas service.

Continuing his lecture, Mr. Widlake stressed the point that the form of trouble mentioned in the cited case had nothing to do with electrolysis. Electrolytic action was a slow and gradual process which resulted in the wasting and ultimate destruction of the pipe. It was fairly prevalent in the case of street gas and water mains in towns where an electric tramway system was used, and was caused by the return current (the whole of which should flow through the tram rails) seeking a parallel path via the adjacent mains on its way back to its source of supply.

The fusion of gas pipes by electricity, however, occurred practically instantaneously, and was only possible where the electrical installation was either of inferior character or had been allowed to lapse into a dangerous condition. Due to one or other of these factors, a short-circuit seeking the easiest path to earth found that path via the gas pipe instead of by a legitimate route which should have been provided as part of the installation.

The lecturer then explained in detail the customary methods employed in the wiring of buildings for electrical purposes, and mentioned that a metallic protecting sheathing used for enclosing an electrical conductor was liable to become "alive" in the event of the conductor insulation becoming damaged or perished. It was, therefore, necessary that such a sheathing system should be electrically continuous throughout its ramifications, and that it should be connected to earth in an effective manner so that an easy path to earth might be provided for any current with which the sheathing might become charged.

The ideal conditions for a dwelling house and the safety of its occupants were: (*a*) The conduits or metallic sheathing in which wires were enclosed should be electrically continuous throughout the entire system, and maintained in that condition; (*b*) the conduits should be in good contact with the general mass of earth, and maintained in that condition; (*c*) the conduits and gas pipes should be so spaced as to make it impossible for them ever to touch each other.

The duties of house fitters and service men could be very clearly defined. In putting in new work or altering pipes in premises where there was an existing supply of electricity, any gas pipe should be so run as to maintain a distance of at least 2 in. between the pipe, electrical conduit, or wire beside which it might run or which it might cross. Where there was a possibility of either a conduit or a gas pipe bridging this space of 2 in. by sagging, a spacing piece of hard dry wood must be rigidly fitted. When it was impossible to maintain this distance, the circumstance should be immediately reported to the inspector in charge. Also, when in the course of his work an employee noticed, or had reason to believe, that an electric wire or conduit was either touching or in close proximity (less than

2 in.) to a gas pipe, or was, by possible sagging, likely to touch a gas pipe, the circumstance should be reported at once.

The risk of damage to gas pipes by electrical fusion varied considerably according to the precise nature of the contact between the pipes and the cable conduits, and in steel-framed buildings it might become a matter of difficulty to prevent metallic connection between the two services.

A practical demonstration of the various points referred to in the lecture was given by Mr. Widlake by means of a working model of two houses connected to a 12 volt accumulator and so wired as to permit of a demonstration of any fault, or combination of faults, which would result in a short circuit current flowing to earth via either the legitimate earthing connection or through the gas meter and gas service pipe. Provision was made for bringing a lead-covered cable into contact with a gas pipe, and coloured lights indicated the path of the return current to earth.

Mr. Widlake dealt with the question of remedies, in regard to which he said a number of suggestions had been made, but none of them seemed very satisfactory. He emphasized the importance of good relations with the electricity supply people. A decent electrical engineer, for his own sake, and for the sake of the commodity he desired to sell, was not likely to tolerate bad work. He (the speaker) knew that some engineers, if their attention was drawn to bad cases of fusion, would strike particular contractors of their list. He knew of one case in which there were particularly good relations existing between the gas and the electricity suppliers. Inspectors would not pass an installation if they had reason to think that the conduits were in contact with gas pipes; but it was most difficult to test an installation for such a state of affairs. It had been suggested that the obligation should be on the gas suppliers, but that would place a terrible onus on them, and in any case they had no right to carry out a test on the electrical fittings. He did not think that the gas industry should be burdened with such an obligation.

Another thing suggested was that they should educate their fitters. He was not suggesting they should make every gasfitter an electrical man, because that could not be done; but they could impart sufficient knowledge to enable him "to smell the rat." The investigation of this sort of thing was a job for the skilled man, but he was helpless unless he was fed with information. If the gasfitter knew enough to recognize conditions which might be due to electrical faults then steps could be taken to have the matter investigated by people competent to deal with it.

They might include some form of instruction on these matters in the educational curriculum, but not, of course, to make the student of the gas industry an electrical engineer. They wanted to give him sufficient knowledge to enable him to identify the trouble and to appreciate how these things happened.

Discussion.

Mr. F. C. Briggs (Dudley) said that the lecture had been so well given that everything the lecturer had said had been perfectly understood. In his town they had experienced both fusion and electrolysis. In one case they had a serious escape of gas right in the centre of the town—and, of course, it occurred on a Saturday night. [Laughter.] They got on the track of it, however, at once, because when they turned off the high-pressure main the escape became less serious. They found a hole in the main as big as a man's fist; and this had been caused by electrical fusion. He spent the whole of Sunday morning, from eight o'clock to one o'clock, chasing various officers of the electrical company, all of whom said they had no responsibility for a particular cable which was near the main. Eventually, when he ran a man to earth, he admitted they had had an electrical fault on the cable on the previous Wednesday, so they had fusion on the service pipe, which occurred undoubtedly for reasons which Mr. Widlake had given. They hoped to eliminate trouble which arose from the transference of current when there were trams, because in the Midlands the trams were being scrapped. They were putting in trolley 'buses, which he hoped meant that they would be immune from the trouble. He wondered what was going to happen with a welded steel main which they had put down. Its electrical conductivity was equal all through, and he wondered whether they ought not to have in some places welded contact rods buried in the earth, so that if they did get any electricity it would have a place where it could leave.

Mr. A. R. Myhill (Birmingham) asked if Mr. Widlake could tell him the reason for the deterioration in the lead-covered cable to which he had drawn attention. It seemed to him that deterioration in the lead would take place on the surface only by corrosion. He did not see how that could affect an efficient connection. In the case of electrolysis from the tramway system, he would like to know if any advantage would accrue from deliberately earthing the gas mains with the tram service.

Mr. C. M. D. Belton (Shrewsbury) remarked that they did not appear to be able to do much to avoid the faults which were likely to occur in house wiring, apart from a close inspection of the actual work. There was room for co-operation between the authorities concerned, as suggested by Mr. Widlake. In his own case, if any palpable fault was noticed or carelessness observed when a house was under construction, their own men gave information; and this was communicated discreetly to the electrical authorities. There was one thing, however, which gave him cause for anxiety, and that was the proximity of cables and junction boxes and other electrical appliances to their own mains, particularly high-pressure mains. He would like to know if Mr. Widlake thought the use of rail bars was an adequate safeguard for the prevention of corrosion.

Mr. Briggs quoted a case in which the road got very hot, and eventually steam rose from it. There was an electric cable near a gas main; but he could not get any satisfaction from the electrical people. That cable was said to be cut off, but there was a definite discharge of electricity through the gas main, and the ground became hot owing to the resistance of the earth, and that there was a liability of the gas joint going.

Mr. A. Roberts (Hereford) said they had had one or two cases of electrolysis in Hereford, although they had no trams. In one instance an 8-in. high-pressure main was crossed by an electric cable, and that left them in time with a hole in the main about the size of an egg. Another trouble was that, on internal work, in some cases they had used a strip of wood to carry compo, and sometimes they found that the electricity suppliers were securing their cable to this strip of wood. They had two cases. One was a glaring one, where, but for the prompt action of the Fire Brigade, the whole building would have been burnt out. In another case, two rooms in a private house were gutted in a short time.

Mr. H. J. Woodfine (Wellington) observed that, in connection with the laying of high and low tension cables, he had noticed that the high-tension cable was laid at a depth of only 2 ft. or a little more, and there was a voltage of 33,000. The only protection was a tile marked "Danger;" and he sincerely hoped none of his men would put a pick into that cable. This did not seem to be enough protection.

The Author's Reply.

Mr. Widlake, in reply, said that most of the questions seemed to turn on bonding. Some months ago he had a conversation with an engineer at Leeds, who told him that regularly every year he had to take out one length of a 6-in. steel main. It was adjacent to a tramway track, and was found to be holed. The tramway authorities told him that if he had a copper bond between the track and his main the trouble would disappear. He advised him not to do it, because, although no doubt his trouble would disappear at that point, it would crop up at other points where he would have to find it. If they took an ordinary length of high-pressure main and tested the resistance, they would find that, with a single 30-ft. length and a similar length joined in 15-ft. sections, the resistance in the latter would be three or four times that of the plain piece. When it had been in the ground for two or three years, it might have two hundred times the resistance. If they were to bond to start with, that meant that they were willing to allow their main to act as a conductor; and they would get current deserting it at every joint. It might cure the trouble at a definite place, but it might also bring unknown troubles in other parts of the district. Also, if they were prepared to bond to such an extent as to make themselves absolutely safe in regard to the tram track, they did not know what trouble they were going to experience by electrolytic drainage between their main and the water main, unless the water authorities associated themselves with the arrangement. The remedy seemed to lie with the tramway people, who should keep within the limits legally provided for them. They would then hear far less of electrolytic damage. Damage would go on, but at a slower rate. Generally speaking, the gas people were the last to know that these limits were being exceeded as regards tramways. He thought they realized that the time would come when the rail bound vehicle would disappear from the streets. It was a subject of bitter controversy, but eventually the tram would disappear in favour of the petrol 'bus or trolley, and the only damage would be by fusion in connection with the supply cables. So far as electrolytic damage from supply cables was concerned, this happened only in connection with direct current systems; and the latter were doomed. When the national scheme was in full operation, alternating current only would be used. So, to all intents and purposes, they could say that, with the disappearance of the rail bound car and the almost universal use of alternating current, electrolytic damage would disappear.

In regard to the deterioration of the lead, he thought this was due to chemical action between the lead sheafs and the clips fitted on the joint boxes. It was almost inconceivable that cable makers of repute, knowing the stresses the cable had to withstand, should put low-grade stuff on the market. Some of the questions reminded him of a point he had forgotten to mention. This was in regard to inside house work. In new work in Plymouth they insisted on a minimum clearance of 2 in. The practice varied with different companies. If any of his fitters could not clear the electrical service by 2 in. he reported to his foreman. The place was visited, and steps were taken to meet this unusual condition.

Mr. Woodfine: Does that apply to alternating current?

Mr. Widlake: I am speaking of an alternating current installation.

Mr. Woodfine: We put a gas service in an establishment, and the electrical people followed us and got as close as they could to our service. I understand that, because it was alternating current, there was little risk.

Mr. Widlake: No risk from electrolysis, but equal risk from fusion.

Continuing, he said that, with regard to old property, when they did a job and found a bad place, they cleared things up. He insisted upon the conduits for cables being electrically continuous, because otherwise it might result in the heating of the ground, and ultimately explosion. He knew it was the practice to put high-tension cables in at a shallow depth, and to protect them with some form of warning; but any fault would clear itself owing to the great precautions taken in laying and jointing the cables to ensure perfect conductivity of the sheath.

Mr. A. W. Smith (Birmingham) proposed a vote of thanks to Mr. Widlake for his lecture, which had enlightened many of them as to the causes of difficulties which they had experienced. One would like a similar lecture given to the whole of their gasfitters. He believed the electrical industry was just as anxious about the problem as was

the gas industry; and he hoped arrangements would be made so that the electrical industry would look after this matter, and not leave it to the gas industry. He thought a maintenance system was absolutely necessary for electrical installations. A man had wiring put in, and he went along merrily until something happened; and the gas company was usually the first to find out that something had happened. This ought not to be. Many electrical contractors were advertising fairly low-priced maintenance schemes; and it seemed to him that it was in that direction they must look for salvation from these dangers.

Mr. W. S. MORLAND (Gloucester) said that on one occasion he had to abandon a section of a main. Trouble arose, and the electricity people insisted they were not responsible; but he was advised they were. They had an analysis made, but could get no redress, so he laid his main some distance away. It seemed rather hard that gas undertakings should have to be responsible for damage done to their mains through no fault of their own.

Mr. SMITH asked if Mr. Widlake considered that the permissible difference in track potentials laid down in this country was sufficiently drastic.

Mr. WIDLAKE: I do not think it affords full protection to either gas or water supplies.

The resolution was heartily carried; and, Mr. WIDLAKE having replied, the meeting terminated.

Manchester and District Junior Gas Association

NOTES ON MAINLAYING

On Nov. 5 the Association visited the works of Messrs. R. & J. Dempster, Ltd., Manchester, and were received by Mr. Charles Dempster and Messrs. Scott, Walker, Mather, and Siddall.

DESCRIPTION OF THE WORKS.

The bays in the buildings for the manufacture of gasholders and structural steel works are 360 ft. long, and have a span of 63 ft. In these buildings are plate heating furnaces, hydraulic presses, cold saws, and sheet shears. Multiple punches and sheet stretching machines, radial drills, and plate edge planing machines were inspected. A specially built floor for setting out full size templates was seen; and the visitors were interested in a machine that will bend plates 30 ft. long by $\frac{5}{8}$ in. thick, and also in a milling machine which can mill 30 ft. lengths at one setting.

The foundries, pattern stores, and other departments were visited; and much interest was taken in the various processes which were being carried out. Afterwards, tea was served in the works canteen, Mr. Charles Dempster being in the chair.

The PRESIDENT (Mr. C. H. Bamber) called upon Mr. Duxbury (Oldham) to move a vote of thanks to the firm.

Mr. DUXBURY paid high tribute to Messrs. R. & J. Dempster, and expressed the indebtedness of the gas industry to them. He spoke about the advantage given to students by being allowed to visit works like those of Messrs. Dempster.

Mr. COLLINGE (Preston) seconded the vote.

Mr. CHARLES DEMPSTER replied, and said he was of opinion that the waterless gasholder had come to stay.

NOTES ON MAINLAYING.

By STANLEY GRIME, of Bolton.

DISTRIBUTION.

There is no doubt that gas is playing its part in the great campaign for a cleaner and purer atmosphere in our towns. Although suffering from trade depression of a very serious character, Bolton has increased the number of consumers by 673, while 3000 new appliances have been fitted during the past year. The total length of mains is approximately 372 miles, the area of supply being approximately 38,642 acres, or equal to something over 60 square miles.

The gas is supplied on the circulating system—*i.e.*, each street or road, &c., wherever possible has "back" gas. By this I mean that a gas main may be "bladdered" off without cutting off the supply to other houses in close proximity.

During the last thirty or forty years the consumption of gas has greatly increased, and mains that supplied a few public lamps have now had to be enlarged to supply domestic or other consumers. Housing schemes and other building developments have added greatly to the difficulties of ensuring an efficient supply of gas. In ascertaining the correct size of main to be laid for any building development, thought must be given to the amount of gas likely to be used, and also to the possibility of further increased demands at a later date. It is our practice to provide for a possible larger demand.

MAINS.

Gas mains should be laid on a good hard bottomed trench, and well packed to prevent disturbance from vibration caused by traffic. This is a very serious problem and accounts for the increased number of broken mains, drawn joints, and minor escapes. The almost constant vibration is a serious menace to the Mains Superintendent.

When laying mains the trench should be deep enough to allow of a sufficient depth of covering as a protection against frost, and vibration due to heavy traffic. The ground should be compact, so that the mains have a good foundation without fear of settlement. The mains should be bedded and the ground scooped away at the sockets. This allows the main a firm foundation throughout its entire length.

In our district we find that turned and bored pipes are the best, and it is a fact that 90 p.ct. of our drawn joints occur on the lead joints, such as specials, &c.

It is important in running joints that the ladle containing the molten lead should be large enough to contain as much metal as will fill the vacant space in the socket at one operation. It might be asked: "But what about running joints on large diameter pipes?" This may be overcome by allowing the molten lead to be poured from two ladles simultaneously. When refilling the trench the soil should be deposited in layers of not more than 6 in., and well rammed before adding another layer. In made up ground the pipes should be surrounded with good virgin soil, to prevent any chemical action that may occur. Ashes, forge, clinker, and refuse from various kinds of works are very injurious to cast-iron and steel pipes.

In common with many undertakings we use under-pressure drilling to carry out certain portions of our work.

UNDER-PRESSURE DRILLING.

Under-pressure drilling is a means whereby a branch main may be connected up at any time without interruption of supply and without loss of gas. We have recently diverted a main over a river employing this method, so that the gas supply to the important district of Horwich was not interfered with.

The bridge with a span of 27 ft. spans the River Croal, and, owing to the widening on the North side, the position of the gas main had to be diverted accordingly.

Previously, an arched steel main of oval section carried the gas over the bridge. This main connected with an 18-in. main at the east and west sides of the bridge, and was laid some 50 years ago.

This main is arched and has a rise of 1 ft. 9 in. and is of oval section (2 ft. 6 in. wide by 1 ft. 1½ in. deep). It is made of ⅜-in. steel plates with single rivetted lap joints. The ends had cast-iron connections converting from the oval section to the circular cast-iron main, and had been cast specially to suit the requirements of the work. The distance between the footpath and the top of the main at the crown of the arch was 5½ in., while the distance between the footpath level and the cast-iron main on each side of the bridge was approximately 2 ft. 5 in., thus showing that the steel main had been made to suit the arching of the bridge. On examination the steel main was found to be in a good condition, and had not at any time given any trouble to our Mains Department.

I will now give briefly a description of how the alterations previously mentioned were carried out.

It was decided to use damper plate connections for jointing the new portion to the existing portion.

The damper valve connection is set up and fixed on the main in the usual way, and the drilling machine attached to the outlet of the connection. After seeing that the damper plate is withdrawn clear of the branch outlet, the drill, which is carried on the main shaft of the machine, is wound forward until it touches the main.

The ratchets are then operated, revolving the gearing which drives the main shaft, and the drilling is commenced. Feed is applied by means of a feed screw which works through a nut in the main shaft, and the drilling is continued until the piece of metal is cut from the main.

To ensure that the circular piece of metal cut from the main does not fall inside, a special drill is fitted with the main cutting drill. This centre drill has a number of plungers which project above the diameter of the centre drill. These plungers are held in position by means of springs located behind them and are so shaped that as the centre drill is fed through the main the plungers come into contact with the main, and are forced inwards below the surface of the centre drill. Immediately they are inside the main they are forced outwards by the springs, thus preventing the piece of metal from becoming detached from the drill.

After the hole has been cut the drill is wound back clear of the damper plate, which is then pushed across the seating against which it is held by means of set screws located at the back of the plate. The drilling machine may then be removed,

and the branch pipes are connected to the damper valve; after this operation the damper plate may be withdrawn clear of the outlet.

In cases where it will not be necessary to use the valve frequently, the damper plate is generally removed entirely and stored. To enable this to be done without loss of gas, a slide is arranged behind the gland through which the damper plate moves. The damper plate is withdrawn sufficiently to allow a narrow plate being inserted in the slide, thus cutting off the gas that would otherwise escape through the gland.

The damper plate may then be removed, and the cover plate finally set-screwed on to the end of the gland. To replace the damper plate it is first entered in the slot and the narrow plate removed from the slide, when the plate may be removed through the gland across the seating.

Services.

Wherever possible services should have a fall to the main of not less than 1 in. in 10 ft. If this is not practicable a small syphon should be placed at the lowest convenient point, to receive water accumulated from condensation.

It is our practice at Bolton to fix services of not less than ¾ in. diameter. The fitting of gas appliances is now on the increase—especially cookers, fires, geysers, &c.—which necessitates larger service pipes. I think this proves that the days of the ½-in. service pipes are over.

The nature of the subsoil must be taken into consideration when deciding the class of the material to be used for service pipe laying. For clay, gravel, or sand, painted steam tube scarcely shows any depreciation after twenty years' use, but if laid in forge slag, or made up ground containing chemical refuse painted steam tube will corrode in six months' time.

For some years we have been using wrapped tubing, the result being satisfactory if the joints are properly wrapped and coated with bituminous substance after being screwed up, if the point of service at which connections have been made is not sufficiently wrapped and coated with a suitable substance corrosion sets in and defeats the efficiency aimed at in using wrapped materials. There is also a danger of contractors' workmen opening up the ground and injuring the wrapping with a pick, allowing chemical action to take place at the exposed point.

In some places where made up ground is of a very bad character, and where other departments are likely to open up the ground such as for water, electricity, or drains, we have laid the pipe in troughs filled up with pitch and covered with 1½-in. thick brick, this appears to be the most efficient, but is very expensive.

Escapes.

Escapes from mains and services call for prompt attention, and should be dealt with instantly. However small an escape may be, if left it may lead to serious results. An efficient system of reporting escapes is necessary, the report being sent through to the Department concerned. Sometimes the persons detecting an escape of gas are very dilatory in reporting the same. If residing in the out districts they may send a postcard or wait until coming into town. This delay may have serious consequences. Consumers should be encouraged to report instantly any escapes however trivial they may seem to be.

Recently we had reported to us an escape of gas at 9.50 a.m. On making inquiries of the tenant how long they had noticed the smell of gas, the tenant replied, "Oh, about a week." After tracing the escape it was found to be a broken 4-in. main. The tenant had complained of feeling sleepy, but had not connected the sleepiness with the smell of gas escaping from the broken main.

We have a system at Bolton whereby the public have the benefit of continuous service in the matter of escapes. Two men are employed on night duty to give instant attention in event of escapes. This system is worked by experienced fitters working a week on nights in their turn, each fitter having a mate who drives the motor and acts as labourer.

The men on duty take a tool box with a complete set of tools likely to be required to cope with the work, and if at night an efficient electric spotlight as well. If the fault is serious and far reaching the driver goes off for more men. This system allows the workmen to proceed straight to the job, and thus saves a great length of the searching for tools and materials. The night men have a motor van in which to attend to the escapes without loss of time.

Since inaugurating this system the promptness with which escapes have been reported and attended to has averted serious complications. There are many causes of escapes—*e.g.*, corrosion, subsidence of the soil caused by the heavy vibration of road traffic, and the drawing of joints or change in temperature.

On receiving the report of an escape the fitter immediately arriving on the site makes inquiries to decide whether or not the escape is in the inside fittings or outside the building. He warns the consumer to extinguish all naked lights and to open all windows and doors to ventilate the rooms and cellars. If the escape is outside the building an ordinary crowbar is driven down the side of and below the level of the main at intervals of a few feet until some spot is found where the leak indicator registers the most gas. At this place an excavation is made and the fault found by uncovering the main. Sometimes on getting down at this point the gas is found to be coming from bad joints and other parts of the main, the gas being conveyed by telephone ducts, or earthenware drain pipes. In a case of this sort it makes the location of the escape more difficult.

Some ten months ago we had trouble locating an escape which had been reported by G.P.O. workmen who were engaged in their work inside a chamber. There was a strong smell of gas present which was traced to the ducts entering the chamber. The chambers lower down the road were then examined till we came across a chamber where no smell was found. This gave a clue that the escape must be between the two points—*i.e.*, the point where the smell was first noticed and the point where there was no smell. We immediately tested all the street crossings and came to a point where the smell was very pronounced. On uncovering the main we found the real cause which was due to three 12-in., one 9-in., and one 6-in. drawn joints. The distance between the two points previously mentioned was approximately 750 yards. We have several times found the point of fracture half a mile away from the point where first detected.

The author then dealt with the method of mapping and recording mains.

Scottish Junior Gas Associations' Joint Visit to the Durie Foundry and the Leven Gas-Works.

The visit to the Durie Foundry of Messrs. Henry Balfour & Co., Ltd., and to the Gas-Works at Leven, Fifeshire, on Oct. 25, arranged by the Scottish Junior Gas Associations, was attended by more than ninety members.

The visitors were welcomed at the Foundry by Lieut.-Col. Balfour Graham, a Director of the Company, who gave them a short historical account of the Company's growth since its inception 120 years ago. Provost Barron, Chairman of the Buckhaven and Leven Gas Commissioners, also offered a welcome, and Mr. David Yule, President of the Eastern District, responded.

The first part of the programme consisted of a tour of the foundry, the various operations in progress being explained by Mr. W. Lindsay Burns, General Manager of the Company; Mr. Cooper, Works Manager; and Mr. Manning. So that the visitors might have an opportunity of seeing the interesting operation of a cast, the Directors had reserved a blast. Those present saw a practical demonstration of the making of purifier plates and of foundry practice in general. The molten metal was transported to the moulds from the furnace in a ladle holding 11 cwt. When cold, the rough castings were placed in a sand-blasting container, from which they emerged smooth and ready for the machine shop, where they underwent the finishing processes. The average blast per diem is 11 tons, and maximum castings of 8 tons can be turned out.

The boiler department excited a great deal of interest. In this department work was proceeding at a fast pace. Here plates were prepared for condensers, gasholders, and other uses. Boiling, multiple punching, shearing, welding, and rivetting portrayed the ease with which ponderous metal structures are shaped and assembled. A hydraulic rivetting machine capable of exerting a pressure of 100 tons attracted a good deal of attention, as also did a Craig & Donald multiple punching machine, which punched a long row of rivet holes near the edge of the condenser plates at one operation.

Mr. Burns described in detail the construction of a set of annular condensers consisting of six tubes 22 in. and 32 in. in diameter by 25 ft. high. The novel point about these condensers, explained Mr. Burns, is that there are five columns for atmospheric condensation and one column which is fitted with tubes to be used as a water-tube condenser. The idea was that of Mr. Low, Gas Manager at Elgin, for whose works the condenser is being made. Several gasholders, in various stages of construction, were on view in the yard. One was being made for the Elgin Corporation, of a capacity of 350,000 c.ft.

Afterwards the members inspected the plant at the gas-works, and Mr. Aitken, Engineer and Manager, together with his staff, conducted the party over the works.

The visitors afterwards adjourned to the Caledonian Hotel, where they were the guests of Messrs. Henry Balfour & Co., Ltd.

In an address after tea, Lt.-Col. Balfour Graham, referring to the gas industry, said that the various statistics which revealed striking increases in the consumption of gas showed that those in the industry were surely finding out the most efficient means of extracting gas from coal.

Other speakers were Provost Barron, and Mr. J. W. Napier, of Alloa, who paid tribute to the firm of Messrs. Henry Balfour & Co., Ltd.

Mr. Yule then called on the members to show their appreciation of Messrs. Henry Balfour's share in the hospitality extended.

Mr. D. Melvin, of Uddingston, President of the Western District, asked Provost Barron to convey to his colleagues on the Gas Commission their thanks for the privilege of viewing the works of the Buckhaven and Leven Gas Commissioners.

Wales and Monmouthshire Junior Gas Association

PRESIDENTIAL ADDRESS OF MR. C. H. COLLINS, OF SWANSEA

The Opening Meeting of this Association was held at Swansea on Saturday, Oct. 25. At the outset Mr. W. E. CROWLEY (Newport) presided.

Mr. E. ABLETT, Secretary and Assistant Engineer to the Swansea Gas Light Company, welcomed the Association.

The members were then entertained at tea by the Chairman and Directors of the Swansea Gas Light Company, after which the meeting was held.

Mr. CROWLEY, the retiring President, inducted the new President, Mr. C. H. Collins, into the chair. Mr. Crowley thanked the Council and members for their able support during his year of office.

PRESIDENTIAL ADDRESS

of C. H. COLLINS, Swansea.

The lighting load is a more important factor than is generally recognized, and of recent years the slogan " Gas for Lighting " has been revived. It is true that to-day it is increasingly difficult to persuade the public that gas for lighting is scientific and economic. I have had personal experience and negotiations with architects and builders on the subject, who, while favourably disposed to gas for heating and cooking, do not like gas for lighting. I have come to regard successful negotiations for gas lighting as real victories. There is no doubt that service plays a considerable part in the retention of existing lighting consumers; and maintenance schemes, policies of replacing obsolete fittings free of cost, and the supply of burners and mantles at cost price, contribute to the retention of the lighting load. Gas switches, now available at marketable prices, enable us to claim that convenience of operation which the public demands.

It is somewhat surprising to find there are still in use a number of water-slide chandeliers. Consumers should be told of the defects of this type of apparatus; and every effort should be made to induce them to install modern burners.

A splendid advertisement is afforded by efficient street lighting; and it is a matter for satisfaction that, generally, public lighting by gas is still extremely popular. It has much to recommend it. It is reliable, there is a complete absence of glare, while capital and running costs compare favourably with other forms of street lighting. Nevertheless, in some instances, undue preference is given to electric lighting, particularly when the electricity undertaking is owned by the municipality. This preference is unfair, and not in accordance with the results of the many practical tests carried out on the respective forms of lighting. These tests have given abundant evidence that, in fair competition, public lighting by gas is efficient and economical, and we can, with confidence of ability to give proper service, undertake lighting schemes, public and domestic, of any magnitude.

THE COOKING LOAD.

Consumers who neglect to clean simple-hire cookers take pride in keeping clean any apparatus which is, or will become, their own property. In my opinion, over 50 p.ct. of cooker complaints arise on account of the failure of the consumer to keep the cooker clean; and it is easy to bring about a reduction in the number of complaints by an extension of the sale of high-grade cookers.

Nevertheless, the fixing of cookers on simple hire should be encouraged, because many people are unable to meet the heavier quarterly charges incidental to hire purchase. Properly maintained simple-hire cookers prove a source of considerable revenue, especially when they are used regularly to the exclusion of the ordinary kitchen oven.

A useful service can be performed by gasfitters in connection with cooker cleaning. While attending to complaints, they may draw the consumer's attention, in a tactful way, to the greater ease of operation and better service possible by keeping the cooker reasonably clean. An indispensable adjunct is an efficient cooker cleaning and repairing department, which, properly organized should ensure along with district work, proper service to the consumer.

HEATING LOAD.

It is perhaps the consensus of opinion that the heating load is more capable of expansion than either the cooking or the lighting load. With regard to gas fires, a wide range of designs and sizes makes it possible to meet the most exacting requirements, but it is essential that the elementary precautions should be taken at the outset. First, the supply pipes must not only be adequate for existing requirements, but must also be capable of meeting the additional requirements of the future. The size of the fire must be carefully decided, after considering the size and aspect of the room and the number of windows; the chimney should be clean; and measures should be taken to prevent excessive upcast. It is unnecessary to emphasize the importance of avoiding all downdraught. People imagine that, because the products of combustion are invisible, a gas fire is a cure for a bad chimney.

We can without fear advocate heating by gas. At one time prejudice was strong against gas fires—doubtless on account of construction. In the old type of fire the greater part of the heat was convected heat, arising from the contact of air with surfaces of hot metal. Often the metal harboured dust, which on burning imparted an unpleasant odour. The prejudice was perhaps greater on account of inadequate flue outlets, the products of combustion being discharged into the atmosphere. These defects, however, have been entirely overcome; radiant efficiency has increased to over 50 p.ct., and convection has been reduced to a minimum.

The modern gas fire is capable of heating a room not only efficiently, but also in a manner beneficial to health. While upright fires are perhaps more efficient than others, an effective demand has arisen for fires of other types, the appearance of the fires often compensating the consumer for possible loss in efficiency.

Fires in hotel bedrooms, fixed in conjunction with slot meters,

THE PRESIDENT,

C. H. COLLINS, of Swansea.

Mr. Collins received his early training with Messrs. H. & C. Davis & Co., of Camberwell (afterwards the Davis Gas Stove Company, Ltd.), and went from there to the South Metropolitan Gas Company. He left that Company to take up a position with the Gas Light and Coke Company. His present post is that of Chief District Inspector to the Swansea Gas Light Company.

are becoming extremely popular, and proprietors are recognizing the additional comfort to their guests which such fires afford.

DOMESTIC WATER HEATING.

The drudgery of washing day is entirely overcome by the utilization of gas-fired washing coppers. This type of apparatus has such obvious advantages that there should be no difficulty in creating an effective demand, especially on hire-purchase terms. As a matter of fact, in Swansea we have fixed 145 already during the current year.

The supply of hot water for general domestic use is usually confined to instantaneous heating and storage heating; and each system has its advantages. There is still a certain amount of prejudice against geysers, doubtless due to the prominence given by the Press to accidents. Provided proper precautions are taken regarding ventilation, and the fixing of the geyser is carried out by skilled fitters, geysers are perfectly safe in operation. Invariably, it has been found after accidents that bad workmanship, in failing to provide adequate means for carrying away the products of combustion, has been the cause. Geysers being designed to consume a large quantity of gas

within a short time, the products of combustion must be carried off in a proper manner by the provision of flue tubes of adequate size, bafflers, and scientifically-designed terminals.

Hot water circulators suffer from the disadvantage that usually they have to be fixed some little distance from the hot water storage tank. Consequently, losses from circulating pipes and tank have to be made good, and the cost of gas, as a result, tends to become a little higher. These losses may be minimized by the provision of lagging for both the pipes and the cylinder, but it is not generally possible to persuade the consumer to meet the additional expense of lagging, and a further objection is that when the cylinder is lagged the benefit of airing cupboards is lost. Notwithstanding, there are many instances in which circulators may be usefully employed, and every inquiry should be carefully considered.

It is usually found that with many of the existing coal-fired boilers the flow and return pipes are connected to the storage cylinder, one above the other, at a distance of approximately 6 in. from the bottom of the cylinder. It is difficult to understand this practice, because it makes it impossible to draw off any hot water until some time after lighting the fire, as the whole of the contents of the cylinder have to be heated before water is available at the hot tap. A further defect is that circulation is sluggish.

When fixing gas-heated circulators, either auxiliary to, or in substitution of, coal-fired boilers, it is essential that the flow-pipe connection should be as near the top of the cylinder as possible. It may even be fixed direct into the expansion pipe immediately above the cylinder, by which means the heated water will be delivered into the cylinder at the top, and small quantities will be available very shortly after lighting up. Another useful device in connection with circulators is the provision of a cut-out valve, placed on the return pipe, at the bottom connection, and an alternative return connection placed about half-way up, so that during the periods when baths are not in use, and hot water is only required for washing up, the valve is closed and only the quantity of water above the top return connection is heated. Consequently, there is a reduction in the consumption of gas. No difficulties should be experienced in making these connections, as special joints, each to fix, are available for the purpose. Another point is that circulators should not be fixed where it is necessary to run big lengths of flues, as considerable annoyance is bound to be caused by condensation. This, of course, may be minimized by the use of non-metallic flues. In any case, however, it is better practice to keep flues of circulators as short as possible.

There is another type of apparatus which is becoming increasingly popular. This is the combined hot water heater and storage. This apparatus, which consumes a small quantity of gas continuously, has an advantage in that it is unnecessary to install particularly large supply pipes or meters, and as a rule existing supply pipes will be capable of meeting the additional demand. This apparatus must, of course, take the place of any original storage tank; it cannot be auxiliary to it, or else its chief claim for consideration—viz., the absence of circulating pipes—is lost. It can be confidently recommended where a new installation is considered, the only disadvantage being that some little time must elapse after lighting before hot water is available. The consumption of gas, however, is so small that it is probable that the apparatus will be in use continuously.

Salesmanship and Service.

Salesmanship should not be confined to those occupying positions in the showrooms. Abundant opportunities present themselves to most employees of a gas company to introduce the question of gas appliances in proper circumstances. In particular, fitters, collectors, and inspectors have special opportunities of introducing new business to consumers in the ordinary course of their work. Further, they have the same opportunities to maintain a pleasant relationship between the consumers and the gas undertaking. All such opportunities should be taken, and turned to good account.

With regard to complaints, these should be given attention as soon as possible. In particular, notifications of escapes should be treated with special care, even if the escape be slight. Goodwill, once established, is an invaluable asset, and it should be maintained by conscientious efforts to please.

Mr. Ablett congratulated Mr. Collins upon his Address. The author, he said, had been connected with the Association for nine years—*i.e.*, since its inception—and had always displayed the greatest interest and enthusiasm. He (the speaker) was glad to see that the lighting load had been mentioned; every endeavour should be made to retain this load. To-day America was regretting the fact that a big proportion of the gas lighting had been lost, and were now making every effort to get it back. He suggested that meter inspectors and salesmen were the ambassadors of the undertaking. They should on every possible occasion take advantage of introducing new business. Salesmen and others in his Company were offered a small commission on new sales and business; and this scheme was proving a success.

Mr. B. J. Bell (Cardiff) mentioned that both Mr. Crowley and Mr. Collins had been stalwarts of the Association throughout its existence; and Mr. Collins had said it was the duty of every young man who was eligible to become a member of a Junior Association.

Mr. J. A. Cunliffe (Swansea) thought that, as most of the sales were transacted with the lady of the house, it would be a decided advantage to form some kind of Ladies' Association. This had been inaugurated with a certain amount of success in connection with electricity. He considered it would create interest in the various gas appliances, and that much propaganda work would be accomplished. He advocated switch lighting as a means of retaining present gas lighting consumers.

Mr. H. D. Hazell (Newport) then proposed a vote of thanks to Mr. Collins, and this was seconded by Mr. Crowley.

Mr. C. S. Thane (Newport) proposed, and Mr. W. T. Lane (Cardiff) seconded, a vote of thanks to the Chairman and Directors of the Swansea Gas Light Company, coupling with it the names of Mr. W. H. Johns, Engineer and Manager, and Mr. Ablett.

London and Southern District Junior Gas Association

Visit to Refractory Works

On Wednesday, Nov. 5, the London and Southern District Junior Gas Association paid a visit to the works of the Stourbridge Refractories Company, Ltd., at Pensnett, near Dudley, under the Presidency of Mr. T. H. Prater, of Margate.

Some forty members took part in this expedition, and Dudley was reached at about 12.30, where the visitors were welcomed by Mr. F. Astbury, Managing Director of the Stourbridge Refractories Company, and straightway proceeded to the Dudley Arms Hotel for lunch. Mr. Astbury, in extending a hearty welcome to the Juniors, apologized for the absence of Sir Arthur Duckham who very much regretted not being able to be present with them on that occasion. Among those present was Mr. T. Campbell Finlayson, M.Sc., A.M.I.Chem.E., of the Woodall-Duckham Vertical Retort and Oven Construction Company, which firm have a considerable interest in the Stourbridge Company.

The Works.

After lunch the Association were conveyed to Pensnett and made a tour of inspection of the works. A feature of these Works is the very considerable amount of female labour employed—almost 50 p.ct. of the employees being women and girls.

This up-to-date Works was laid down in 1914 to deal with the manufacture of firebricks, blocks, tiles, retorts, &c., the need of a scientific product being realized. The original Works consisted of a battery of 16 chambers arranged in two sets of eight each, but in 1925, this battery was found to be insufficient to cope with the growing demand for the Company's specialities, and a further battery of 14 chambers was added.

The Works are ideally situated, being in the midst of a great mineral wealth—fireclay and coal being mined in close proximity—and flanked with a canal and railway service on either side.

The firm specialize in the manufacture of highly refractory firebricks, leading lines being vertical and horizontal retorts, segmental retorts, furnace linings, W.G. generator and regenerator blocks, chequer bricks, &c., for water gas plants, refractory insulating blocks, coke oven bricks and blocks and firebricks of every standard size.

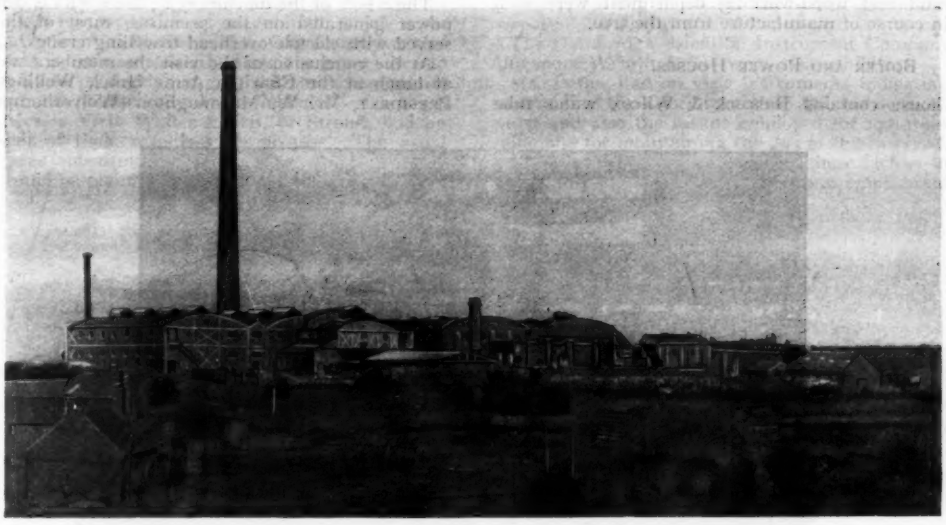
Suitable Cements.

Realizing the need of suitable cements for work with their goods, the Company have placed upon the market special mixtures, their "B" Jointing Mixture is ideal for work with silica bricks, while the No. 4 is very adaptable for use with fireclay material.

The following is a brief outline of the processes seen:

Bay No. 1.—This houses the original battery of kilns consisting of 16 chambers of the semi-gaseous producer type. On the floor above are two brick machines and one power press for the completion of special bricks, and spacious drying floors.

Bay No. 2.—Here are the crushing plant used for the crushing of various clays, &c.—one lightning crusher for crushing grog and two high-speed rolls for crushing quartz. The products of the grinding plant are measured off in correct proportion; the whole of the dust being extracted, and the sizeable material is then passed to collecting bins, which are connected to a small hopper in which a definite quantity of each class of material is measured. This hopper is worked by a lever which ejects materials into a mixer and after being mixed dry, the materials are taken by an elevator to various pug mills.



GENERAL VIEW OF THE STOURBRIDGE REFRACTORIES WORKS.

Bay No. 3.—In this Department is a ball mill in which are manufactured various clays and hot patching cements. There is also a new battery of kilns consisting of 14 chambers, each having four semi-gaseous producers of the improved type.

All the chambers are controlled by fans giving a consistent pull on the furnaces, and a further system of fans keeps the drying floors at an equable temperature.

The laboratory report shows that the thermal conductivity in B.Th.U. per sq. ft. per hour per 1 in. thickness per 1° Fahr. of the refractory insulating bricks is as under:

Temperature Range.	Average Temperature.	Co-efficient of Thermal Conductivity in B.Th.U.
400°—220°	310°	3·762
600°—330°	450°	3·812
800°—432°	616°	4·756

Porosity—62.

Vote of Thanks.

After the tour of inspection, the Association partook of tea at the Works, when

Mr. Prater expressed the thanks of the Association for this exceptionally interesting visit. They had been privileged to witness processes by which the bricks they all used were manufactured. One of the things that impressed him was the care which was exercised in ensuring that each brick was the exact replica of the previous one. They fully appreciated the great care which brick manufacturers were taking in the course of manufacture. The hospitality that had been extended to them that day had made the visit of exceptional interest, and he asked Mr. Astbury to accept their very hearty thanks.

Mr. W. Grogono (Croydon), in supporting the vote of thanks, said that what had struck him most was the amount of hand moulding work done. But when they realized that one firm might order thousands of different shapes of refractory material, they would understand why there was such a considerable amount of hand work. He had had these bricks under observation and knew that they gave excellent results. Wherever one went one heard that these bricks were good and reliable. "I would like to thank you personally," concluded Mr. Grogono, "for your trouble in showing us round the works this afternoon."

Mr. Astbury, in reply, thanked the Association very much for the vote of thanks. Their aim, to his mind, had always been to give service to all their customers, irrespective of such matters as price or profits, and his Chairman had always impressed upon him that it was to their interest and to the interest of the gas industry that they should favour such visits as these. It was a recognized rule that all gas engineers should have an entrée to their works. They had nothing to hide; the criticism that came along helped them to make progress for the gas industry. The gas industry was making great progress in methods that required greater temperatures, and they must be in a position to produce refractories for these higher temperatures. It was advisable that the refractory manufacturers should be given every detail in regard to fuels utilized and the processes, so that they might not make mistakes on account of insufficient data having been furnished to them. "Gentlemen," concluded Mr. Astbury, "I thank you for your presence here to-day, and I hope it has been of benefit to you to see a few of the troubles that the refractory manufacturers have."

Midland Junior Gas Association

Sixty-six members of the Midland Junior Gas Association journeyed to Donnington, Salop, on Saturday, Oct. 25, to inspect the works of Messrs C. & W. Walker, Ltd.

Upon arrival, the visitors were welcomed by Mr. J. H. Beard, General Manager, and Mr. R. J. Milbourne, Managing Director, and spent an interesting and instructive morning touring the extensive works, of which the following is a brief description.

Constructional and Sheet Departments.

In this department are manufactured gasholders, spirally-guided and guide framed, also the dry or Klönne holders; steel tanks for oil, water, &c.; constructional steelwork for retort houses, roof principles, &c.; electrically welded steel pipes and electrically welded constructional details. The visitors also witnessed the straightening, shearing, punching, drilling, and bending of plates for gasholders and tanks. The shops are served by four electric overhead travelling cranes.

Planing Department and Purifier Erecting Shops.

In these departments were to be seen planing, milling, and radial drilling machines for the machining of plates required for the construction of purifiers, tanks, sulphate of ammonia stills, &c., and purifiers being erected before shipment so as to avoid erecting troubles at site. Water tube condensers were also seen in course of erection, with their tube plates, &c. These shops are served by electric overhead travelling cranes.

Foundry.

The foundry contains two cupolas, each of a capacity of 30 tons per day, with charging platform, scrap and pig-iron stores, sand crushers and mixers, also loam and green sand moulding for purifier plates, pipes, connections, and other large castings. In this shop are cast the Milbourne valves and the Weck valve in numerous sizes. The foundry is served by three 10-ton electric overhead cranes, and has three spacious core baking ovens.

Pattern Shop and Stores.

These house the usual complement of band and circular saws, and planing machines, lathes, &c., the stores adjoining having accommodation for about 20,000 patterns.

Machine Fitting and Erecting Shops.

Here were seen the duplex, Weck, and double-disc valves in course of construction, the Weck valve having a revolving arrangement for cleaning the valve faces; Milbourne roller carriages in course of manufacture; part of a horizontal washer-scrubber for shipment, and a complete one for Wellington (Salop), the latter being provided with manholes at the sides for introducing and withdrawing wood device bundles, and having adjustable shafts, the connections being on the top. These shops are served by four 5-ton overhead travelling cranes.

In the sawmill and wood-working department were seen purifier grids in course of manufacture from the tree.

BOILER AND POWER HOUSES.

The boiler house contains Babcock & Wilcox water tube boilers with Lassen & Hjort water softener, together with the usual complement of pumps, &c.

In the power house were to be seen Belliss & Morcom high-speed steam engines coupled to 220-volt D.C. generators. A "Unaflow" generating set, electrically driven air compressor with automatic control, and in the hydraulic house a set of "Tangye" duplex steam pumps, supplying water at 2000 lbs. per sq. in. working pressure to two hydraulic accumulators which provide reserve of power for the hydraulic plant in the works.

The whole of the machinery in the works is driven by electric power generated on the premises, most of the shops being served with electric overhead travelling cranes.

At the conclusion of the visit the members were entertained at lunch at the Charlton Arms Hotel, Wellington, when the PRESIDENT, Mr. W. Macnaughton (Wolverhampton), proposed a hearty vote of thanks to the firm for their hospitality, which was seconded by Mr. W. L. S. SPINKS (Birmingham), the Senior Vice-President, and carried with acclamation.

The majority of the members then paid a visit to the works of the Wellington Gas Company, and during tea—which was kindly provided by the Directors of the Company—opportunity was taken by the President to congratulate Mr. H. J. Woodfine, the Engineer and Manager, upon his election to the Presidential Chair of the Midland Association of Gas Engineers and Managers.

Hastings and St. Leonards Science Exhibition

[By a Special Correspondent.]

There has just been held at the White Rock Pavilion at Hastings an excellently organized and run Science Exhibition. The Mayor, Mr. Russell Davies, K.C., and the Corporation gave it their blessing; and among the members of the Committee responsible for its success one noticed the name of the Engineer and General Manager of the Hastings and St. Leonards Gas Company, Mr. Charles F. Botley, M.Inst.C.E., Past-President of the Institution of Gas Engineers, who is always to the fore in work of this character. His daughter also assisted in staging some of the meteorological exhibits.

There were several lectures delivered during the week of the exhibition, the most notable being that given by Sir Leonard Hill, who took for his subject that of the means for eliminating the impurities in the atmosphere, and conferring on the community the blessing of unobstructed sunlight. At that lecture the Mayor presided, and took the opportunity of expressing the obligations of the Corporation to all who had contributed in any way in the achievement of the success which was registered in every department of the show. Several thousands of the residents and visitors of Hastings visited the exhibition during its run.

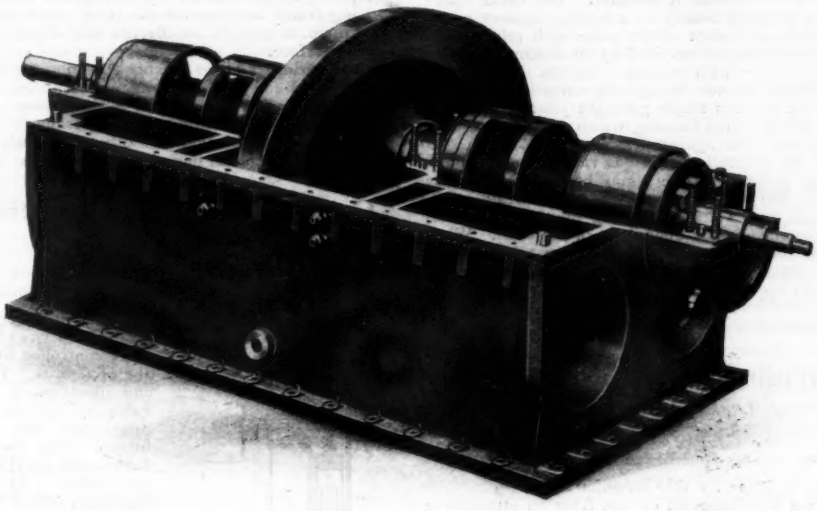
The exhibit of the Gas Company consisted of a fine display illustrating the progress of gas lighting from early times to the invention of the Welsbach mantle. Although there is no public lighting in the town (it is all carried out from the Corporation's electric mains) there was a good exhibit of gas lamps for street lighting; also an example of high-pressure lighting with compressor actuated by an electric motor. The Pavilion, which is owned by the Corporation, was not originally piped for gas, but in consequence of the necessity of having gas available for the purposes of the exhibition, and also because the caterers of a large dinner given on the occasion of the Advertising Convention held earlier in the year demanded gas-heated plate warmers, the Corporation decided to introduce gas

into the building. Full advantage was taken of the circumstances and gas was employed in various exhibits, which without it would have been ineffective. The Gas Company also showed a complete set of samples exhibiting the many uses to which coal is put in the production of gas; sulphate of ammonia, coke, aniline dyes, tar products, &c., were included.

The firm of Messrs. Geo. Waller & Son, of Stroud, had an interesting exhibit of their crankless compressor. The usual cast-iron plate was substituted by a transparent glass plate, through which could be plainly seen the motion of the machine. It was being very slowly rotated by suitable mechanism for that purpose. An illustration of this compressor is given here.

The Cambridge Scientific Instrument Company and Messrs. Alexander Wright & Co. were also exhibitors.

Mr. Botley had on view instruments indicating the mode of ascertaining the calorific value of the gas sent out by his Company, and also the means employed for maintaining it at that value and for maintaining the gas at the correct specific gravity and pressure. The importance of these factors in giving satisfaction to the Hastings consumers was emphasized.



WALLER'S CRANKLESS COMPRESSOR.

Early Days of the Gas Industry

From the Files of the "JOURNAL"

Coal Tar for Roads.

From our correspondence columns, June 9, 1857:

"Sir,—I cannot help being amused at the observations of the learned metropolitan guardians of our health as to the nuisance arising from the use of crude tar for coating the gasholders and other ironwork. Let any of them pay a visit to Sheffield or Nottingham, and he will find nearly all the public roads made and repaired with a species of concrete formed of crude coal tar and broken stones, without any detriment to the public health or the convenience of the inhabitants. . . G. H."

The Father of Gas Lighting.

From the Correspondence Columns of the "JOURNAL", for Jan. 29, 1861:

"Sir,—In your 'Journal' of this date (Jan. 15) you refer to the late Samuel Clegg as the 'father of gas lighting'—a designation which, with the most entire appreciation of the talents and excellent qualities of the lamented deceased, I submit can properly be claimed only for my father, the late Frederick Albert Winsor, the founder of the Chartered Gaslight and Coke Company. . . F. A. WINSOR."

"Sir,—In your obituary of the 15th inst., I perceive you allude to the recent death of Mr. Clegg—a man, no doubt, who has rendered very great services to his country by his ingenuity and perseverance—but I cannot allow you, without contradiction, to call him the 'Father of Gas Lighting.' That title I claim for my late father, William Murdock, and all conversant with the early history of gas lighting have long awarded it to him. . . JOHN MURDOCK."

Wanted, a Gas Manager.

From our advertisement columns, Jan. 28, 1862:

Wanted immediately, a man to take the management of gasworks for a village in Bedfordshire, where the whole of the duties will have to be performed by the person appointed. He must, therefore, be able to lay services, fix and repair meters, direct the setting of retorts, and keep the working accounts. Wages, 17s. per week, with house, coal, and gaslight free.

An Offer to Test Gas.

At the last meeting of the Dover Local Board of Health, the mayor read a letter the town clerk had received from Mr. Samuel Hughes, offering to visit Dover and test the quality of the gas by means of a new instrument, of which he is the inventor. His fee for the service he proposed to render would be fifteen guineas. Mr. Robinson wished to know if, after paying this amount, the board would derive any ulterior benefit, or whether the advantage would cease with Mr. Hughes' visit. If the latter, he did not see the use of spending fifteen guineas; but if an instrument for testing the gas at any time were left with the board, some permanent benefit might accrue, and the money would not be ill spent. Of what use would it be to the man who took his half-pint of beer regularly to have a solitary half-pint analyzed? (1861.)

Cooking by Gas.

On Monday some experiments were made at the Bath Gas-Works to prove the efficiency of gas as applied to domestic purposes, and to test certain modifications applied to the gas cooking-stove by Mr. Warner, the inspector of the company. The apparatus was fixed in the dwelling-house of Mr. Helps, the secretary, through whose courtesy we were invited to partake of a sumptuous repast. . . . The improved stove by Mr. Warner is something less than three feet square. In its construction the due supply of oxygen to the flame has been particularly attended to, and thus is produced intense heat in a manner similar to the production of highly illuminating power in the gas burner. The stove consists of one spacious roasting chamber, over which is an oven capable of baking three or four good-sized tarts or pies. On the top are three appliances for boiling and stewing, and on the opposite side of the stove is a smaller roasting chamber, over which a light tubular boiler is fixed, for the purpose of heating water and cooking by steam. This part of the apparatus can be removed at pleasure, and in any apartment supplied with water and gas it can be made applicable for hot bathing or other purposes. There is also an ingenious contrivance for broiling and toasting. Altogether the stove appears perfect, and is capable of being manufactured to any size. During our attendance the following articles were dressed and served up in excellent style: Chicken and ham, roasted beef, and steamed leg of mutton; potatoes, French beans, peas, and carrots; two large tarts, and a pudding—the total cost of cooking being only fivepence. The party appeared thoroughly to enjoy themselves, and well toasted the chairman, directors, and officers of the company. It is an erroneous idea to suppose that meat is only baked in a gas stove. In roasting, a heat of about 350° is sustained at the surface of the joint, which is but slightly charred. The fluids in the interior of the meat are raised to a temperature of 212°, and the flesh is thus broiled in its own juices.—Aug. 17, 1858.

REGISTER OF PATENTS

Thermostat for Gas Ovens, &c.—No. 335,819.

THE WILCOLATOR COMPANY, of Newark, N.J. (Assignees of E. L. FONSECA, the same address).

No. 36,324; Nov. 27, 1929. Convention date, Nov. 27, 1928.

This controller includes the usual valve housing with gas passages leading thereto, and a rod and tube thermostat. The valve which is actuated by the rod is mounted loosely on a member against which the rod loosely bears, the adjustment of the valve with reference to this member and to its seat being determined by an abutment carried by the member and adjustable with reference thereto. The means for effecting this adjustment extends through the valve itself and out through the housing wall where a single gas-tight joint is provided, so that the interior of the tube and housing which are open to each other may be readily made tight against leakage.

In an installation of the controller on a gas range, the gas pipes which lead to and from the valve housing may be placed inside the oven, between the lining and the outer wall, this space being available for receiving certain of the devices leading up to the thermostat, which should be mounted in the upper part of the oven. When that is done, the ends of the pipes may be secured into a body which has a pair of passages in it and flanges protecting at the ends of these passages, the end of each flange being received by a seat formed within a wall of the valve housing of the controller, from which seats passages lead to opposite sides of the valve.

Dust Deposition.—No. 336,201.

WOODALL-DUCKHAM (1920), LTD., and DUCKHAM, A. M., both of Victoria Street, S.W. 1.

No. 17,411; June 6, 1929.

The following claims are made for this invention:

A method of controlling the deposition of dust from an atmosphere containing it in suspension by changing the relative density of the dust and of the atmosphere in which it is suspended by the introduction into the atmosphere of a quantity of steam or other suitable vapour or gas or liquid spray wherein the dust particles are borne by a stream of air which is repeatedly circulated in a definite direction through a depositing chamber and the stream or jets of steam or equivalent fluid medium introduced into the chamber are directed into the air stream in a direction opposite to its course.

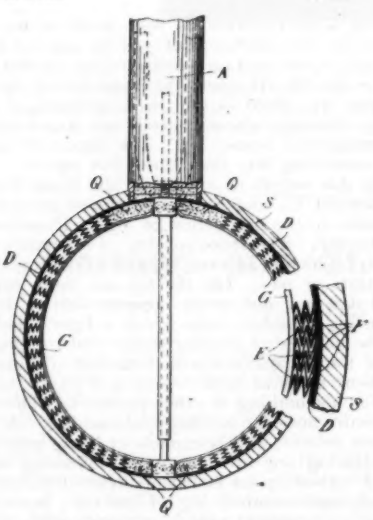
A method according to the preceding claim, wherein the admission of the fluid medium into the settling chamber is controlled by a device which is automatically brought into operation by the admitted gas or vapour.

Gas Main Stoppers.—No. 336,131.

WILKINSON, H., of Slough.

No. 34,238; Nov. 9, 1929.

This invention is illustrated by the accompanying drawing, which is a fragmentary composite view showing in sectional elevation the arrangement of the laminated spring frame of one form of gas main stopper and to an enlarged scale the manner in which the coil springs are disposed thereon



Wilkinson's Gas Main Stopper.

As shown, a barrel A threaded at its base to screw into a correspondingly threaded hole in a gas main S normally contains a flexible diaphragm D and a frame made of laminated springs G carrying the diaphragm D, between which and the frame G are disposed a plurality of coil springs E, F. The position of the spring frame and diaphragm in the barrel is indicated by broken lines, the frame and diaphragm when expanded to stop the main being shown in full lines. Pieces of felt Q are provided at the ends of the laminated springs to take the place of coil springs at these points, because coil springs would be likely to foul the edge of the barrel when in use.

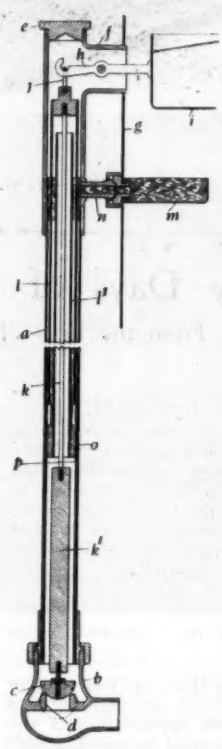
The coil springs on the laminated spring frame G are arranged in two parallel rows extending therearound, and the springs E of the one row are mounted in staggered relationship to the springs F of the other row. As a result of this disposition of the springs, the diaphragm is pressed firmly throughout the length of the laminated spring frame between the pieces of felt against the inner surface of the main, to provide an effective seal despite any irregularities in the inner surface.

The springs may be arranged in more than two parallel rows, and the desired end will be attained so long as the springs are disposed irregularly otherwise than in a single row, so that at any point in the length of the laminated spring frame it is impossible to draw a straight line of substantial width transversely thereof which does not pass through at least one of the coil springs.

Gas Valve for Water Heaters.—No. 336,400.

PARKINSON STOVE COMPANY, LTD., and GIBB, D. M., both of Birmingham.

No. 29,685; Oct. 1, 1929.

This invention relates to water heating apparatus, particularly of the geyser type, in which the supply of gas to the burner is automatically controlled by the water admitted to the apparatus. The accompanying drawing illustrates a water controlled gas valve mechanism constructed in accordance with this invention. A vertical tubular body part *a* terminates at its lower end in a fitting *b* containing the gas valve *c*. The valve itself may be of hemispherical or flat form co-operating with an annular seating *d*. At the upper end of the body part, which is preferably closed by a removable plug *e*, is arranged a lateral branch *f*, the outer end of which can abut against or enter one side of the main part *g* of the heater. Within this branch is pivoted the operating lever *h*, which extends beyond the branch into the main part *g*, and has attached to its outer end the usual perforated counter-balancing water receptacle *i*. The inner end of the lever is attached by a link *j* to the upper end of a vertical stem *k* attached to the valve.

Gas Valve for Water Heaters.

An intermediate part of the valve stem is surrounded by a water seal, as in previous constructions, the seal comprising a pair of telescopic tubes *l*, *l*¹, one of which is secured within the body part and the other to the stem. The seal is automatically kept at the required level by water flowing out of the receptacle *i* into a pan *m* which communicates with the seal through a lateral branch *n*. This pan, like the water receptacle on the lever, is contained within the main part *g* of the apparatus.

The portion k^1 of the valve stem between the lower end of the seal and the valve is made to serve as a counter-weight, and as this occupies a large portion of the inner diameter of the surrounding body part it is necessary to provide within the body part a plug or partition *o* which forms the lower end of the seal. For convenience of construction this partition is secured on a tube *p* which is inserted within the portion of the body part containing the counter-weight, the lower end of the tube *p* being jointed to the body part in any convenient manner.

Prevention of Gum Formation in Distribution Systems.—No. 336,456.

HUMPHREYS & GLASGOW, LTD., of Westminster (Assignees of W. H. FULWEILER, of Delaware).

No. 33,505; Nov. 4, 1929. Convention date, Dec. 17, 1928.

Gummy deposits result from the oxidation or polymerization of potential gum forming hydrocarbons in the gas being distributed, principally indene and styrene. According to this present invention the potential gum forming compounds are not removed from the gas, but their tendency to form gums in the distribution system is overcome, or at least greatly reduced, by the addition to the gas of small quantities of the mono or poly hydric derivatives of benzene or its homologues (for instance cresol, hydroquinone, or pyrogallol).

These derivatives of benzene may be added by employing any suitable apparatus, modified as necessary to suit the vapour pressure of the particular derivative employed. Merely for illustration, the gas may be passed through a chamber into which the gum forming inhibitor is sprayed.

Operation of Water Gas Generators. No. 336,203.

BRASSERT, H. A., & Co., of Chicago, and THE WESTERN GAS CONSTRUCTION COMPANY, of Fort Wayne (Assignees of W. B. CHAPMAN, of New York, C. W. ANDREWS, of Chicago, and H. B. YOUNG, of Oak Park, Illinois).

No. 17,570; June 7, 1929. Convention date, Nov. 27, 1928.

The following claims are made for this invention:

1. A method of operating a water gas generator equipped with means at the bottom of the fuel bed for substantially continuously removing ash from the fuel bed within the generator, characterized in that the ratio of the amounts and proportions of air, down-steam, and up-steam supplied to the generator is so regulated as to maintain the fuel bed in a state of substantially constant density, and to maintain therein a zone of temperature sufficiently high at least to partially liquefy the ash, and also a cooler zone below this zone in which ash tends to re-solidify and is engaged by an ash removing device.

2. A method according to claim 1, characterized in that the ratio of down-steam to up-steam is sufficiently high to lower the maximum temperature zone to a point just above the ash removing device, due regard being had in determining the ratio to the ash characteristics of the fuel employed.

3. A method according to claim 2, characterized in that the ratio of up-steam to down-steam, and also the air steam-ratio, is determined by limiting the amount of up-steam supplied to the generator.

4. A method according to any of the preceding claims; characterized by employing fuel having an ash content of about 9 p.ct. with an ash fusion point of about 2400° Fahr., and in air-blasting and steaming the fuel bed in the ratio of about 42 c.ft. of air per lb. of steam, and so proportioning the amounts of down-steam and up-steam as to establish a ratio of about 72 parts down-steam to about 28 parts up-steam.

Gas Producers.—No. 336,335.

WEST, F. J., WEST, E., and WEST'S GAS IMPROVEMENT COMPANY, LTD., all of Manchester.

No. 23,623; Aug. 1, 1929.

The grate of a gas producer in accordance with this invention comprises a plurality of bars parallel with one another and pivotally mounted in position with means for turning or oscillating them simultaneously about their pivots so that they move in unison. The upper surface of each bar is curved, and relatively long slots, spaced a short distance apart, extend inwards from the opposite edges of the curved face. The slots in one bar come opposite the unslotted portions of the adjacent bars. The pivotal support of each bar may be by trunnion-like parts thereon which are carried in bearings arranged so that the lower part of each bearing can be withdrawn to allow of the ready removal of a bar for inspection purposes. The oscillation of the bars may be effected from a crank and connecting rod through a rod having slots therein into which enter projecting lugs or crank pins upon the respective bars. The movements of the bars in unison effects, due to the shape of the bars, an efficient clearing of clinker.

The bars have spaces therein for holding water and/or for the passage of steam, which issues around the bar and travels up into the producer.

If desired the trunnions by which the bars are pivotally supported may be removable from the bars to permit the latter to be withdrawn when desired.

The grate is of rectangular form and the water jacketted producer casing of cylindrical form. A feed hopper with a rotary valve at its upper end is disposed centrally above the producer chamber, the delivery from the hopper being by way of a central feed pipe with a mouthpiece at its lower end, which is closed by the fuel in the producer so that, as the level of the coke or fuel falls due to the producer action, a further feed from the hopper to the fuel bed takes place automatically. Thus a uniform thickness of fuel is obtained in the producer.

Production of Mixed Oil Gas and Water Gas. No. 336,525.

HUMPHREYS & GLASGOW, LTD., of Westminster (Assignees of J. A. PERRY, of Philadelphia).

No. 3370; Jan. 31, 1930. Convention date, March 2, 1929.

The following claims are made for this invention:

1. The process of making a combustible gas comprising mixed water gas and oil gas, which, when practised in an inter-communicating generator and a heat storage vessel, includes the following steps: Providing an ignited fuel bed in the generator, air blasting the fuel bed and generator and vessel in series, and burning the blast gas in the vessel, simultaneously introducing a supply of fluid hydrocarbon to the generator and another supply of fluid hydrocarbon to the vessel, and simultaneously passing this fluid hydrocarbon in two streams. One stream is passed through the generator and fuel bed, depositing carbon therein, and the other stream is passed through the vessel. The resultant oil gases are led off from the generator and from the vessel; the fuel bed is steamed; excess carbon deposited therein is consumed by the air blast; and water gas is produced, which may be carburetted with hydrocarbon in the vessel. The three newly made gases are admixed.

2. A process according to claim 1 wherein the gases from the heat storage vessel are passed through a superheater.

3. A process according to claim 1 wherein the oil is passed into the generator, and oil gas, with or without steam, is passed into the vessel.

Parliamentary Intelligence.

[From Our Special Correspondents.]

House of Lords.

Special Orders.

The following Special Orders have been laid upon the Table of the House and referred to the Special Orders Committee: Heathfield and District; Plymouth and Stonehouse; Stoke-on-Trent; Yorktown (Camberley) and District; Rochester, Chatham, and Gillingham.

House of Commons.

Special Orders.

The following Special Orders have been laid on the Table of the House: District Gas Company (Heathfield), Ltd.; Yorktown (Camberley) and District Gas and Electricity Company; Plymouth and Stonehouse Gas Light and Coke Company; City of Stoke-on-Trent.

Plans have been deposited in connection with the following Special Orders: Brighton and Hove, Derby, Northampton, Sheffield, Watford and St. Albans, and Yeovil.

The Rochester, Chatham, and Gillingham Special Order has been presented and ordered to lie upon the Table of the House.

Government Assistance to Gas Industry.

Mr. HERBERT MORRISON, the Minister of Transport, speaking in the Debate on the Address on Nov. 4, said that the Government had not forgotten the gas industry, which was being assisted to the extent of £2,300,000.

Coal Mines Act.

Mr. MILLS asked the Minister of Mines if he was in a position to announce the personnel of the Consumers' Representatives and the Chairmen of Panels, under the Coal Mines Act, 1930.

Mr. SHINWELL said that eighteen Committees of Investigation would be set up under Clause 5 of the Coal Mines Act, 1930. Eleven Committees had already been appointed, and he hoped to be in a position to complete the appointment of all the Committees at an early date.

For the Durham area, Mr. T. P. Ridley, F.C.I.S., is a consumers' representative.

Legal Intelligence

Nottingham Conspiracy Charges.

When the cases involving charges of conspiracy and larency in connection with the Gas Department of the Nottingham Corporation again came on for hearing by the City Magistrates on Wednesday last, it was stated that exhaustive investigation in relation to accounts covering a period of ten years was proceeding, and that in order to bring matters within reasonable proportions, six charges of larceny, in addition to those of conspiracy, would be preferred against the nine defendants. The cases, it was intimated, involved many thousands of pounds.

Sea Pollution at Torquay.

There was a sequel at Paignton County Court on Saturday, Nov. 8, to the recent conviction and fine of £20 and costs imposed on the Torquay and Paignton Gas Company for discharging oil into navigable water at the gas-works. Mr. G. H. L. Easterbrook, on behalf of the Company, applied to the Justices to state a case for appeal to the High Court, and submitted the names of two persons for the purpose of recognizances. The Presiding Magistrate intimated that the Bench was prepared to state a case except in so far as one point set out in the Company's notice was concerned, and was prepared to accept the recognizances of Mr. Easterbrook in the sum of £250.

Gas Acts (1920 and 1929) Orders.

SPECIAL ORDERS.

Alnwick Gas Company.

To make various financial provisions, including the fixing of a new sliding-scale.

Little Hulton Urban District Council.

To enable the Council to take or supply gas in bulk; to confirm an agreement between the Farnworth and Kearsley Gas Company and the Council for the laying by the Council and the Company of inter-connecting gas mains and for the supply by the Company to the Council of gas in bulk for use and distribution within the limits for the time being of the Council for the supply of gas, or for any other purposes for which the Council may require gas; and for other purposes.

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

Reports from brokers intimate that there is at the present time an increasing demand for first-class debenture issues, and a glance at the Stock and Share List will show to what extent this has been reflected in gas debentures. No less than fourteen issues increased in value last week; and it is gratifying to note that most of the debenture stocks quoted in the List are now standing at a higher value than at any time during the year 1929. The current price includes in the majority of cases from four to five months' interest. The highest increases were recorded by Maidstone 3 p.ct., with a gain of 4 points to 55-58; while British 4 p.ct., Southampton 4 p.ct., and Sutton 5 p.ct. each rose 3 points. Among ordinary stocks to show improvements were Bristol 5 p.ct., 1 point to 92½-93½ at the local Exchange; Croydon sliding-scale, 1 point to 105-108; and South Suburban, 2 points to 102-105. Two preference issues improved—viz., Aldershot 4 p.ct., and Uxbridge, Maidenhead, and Wycombe 5 p.ct., both by 3 points to 72-75 and 88-93 respectively. The only two stocks to record decreases were European ordinary by 3 points to 100-110, and at the local Exchange the Newcastle and Gateshead £1 units 1½d. to 16s.-16s. 9d.

The attention of intending investors is drawn to the 5 p.ct. maximum stocks of the Aldershot and East Hull Companies, which are rather low-priced at the present time. It will be noted that a parcel of the former Company's stock changed hands last week at 75, and at this price the yield is £6 13s. 4d. The Company also supplies electricity and water, and the volume of business in all three sections is increasing rapidly. The yield on the East Hull Company's stock at the current price of 70 is £7 2s. 10d.

The Directors of the Montevideo Gas Company have announced an interim dividend of 3 p.ct., free of tax, payable on Dec. 1. This rate is the same as for the corresponding period last year, and is being paid on the increased capital of £675,000, against £600,000.

Coal Markets.

Seasonal influences are making themselves felt to some extent, and house coal trade has been brisker in places. Industrial fuel is still, however, very quiet, though the demand for gas coal generally improved last week, and the output was able to be increased in several directions.

On the Newcastle Market the better qualities of gas were in better request than for some time, and in some cases quotations were advanced a few pence. But the total production is very considerably below normal, and a process of restriction is being enforced by natural circumstances which the Act is to regulate artificially, and it is difficult to see how it is to improve matters. Committees for Durham and Northumberland are now appointed to allocate the quotas when these are received from the Central Committee, and, in the meantime, as elsewhere, anything except day-to-day trade is held-up.

Nominal quotations are still generally round 15s. 3d., f.o.b. for Wear specials, 14s. 6d. to 14s. 9d. for best quality Durhams, and 12s. 6d. to 13s. 3d. for seconds and others. Yorkshire screened gas for export is quoted at 16s. 6d. to 18s.

Gas coke remains firm at round 21s. 6d.

Current Sales of Gas Products.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Nov.* 10.

The prices of tar products are as follows:

Pitch is 47s. 6d. per ton f.o.b.

Creosote, for export, 6d. to 6¼d. per gallon f.o.b.

Pure toluole is about 2s. per gallon; pure benzole, about 1s. 8d. per gallon; 95/160 solvent naphtha, about 1s. 5d. per gallon; pyridine bases, about 3s. 9d. per gallon.

The prices for spirits are all naked at sellers' works.

Tar Products in the Provinces.

Nov. 10.

The average prices of gas-works products during the week were: Gas-works tar, 20s. to 24s. Pitch—East Coast, 46s. f.o.b. West Coast, Manchester, Liverpool, Clyde, 46s. f.o.b.* Toluole, naked, North, 1s. 6¼d. to 1s. 7¼d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 2¼d. to 1s. 2¾d. Heavy naphtha, North, 11d. to 1s. Creosote, in bulk, North, liquid and salty, 3¼d. to 3⅜d.; low gravity, 1¾d.; Scotland, 3¼d. to 3⅜d. Heavy oils, in bulk, North, 5⅛d. to 6d. Carbolic acid, 60's, 1s. 4½d. to 1s. 6d. Naphthalene, £10 to £12. Salts, £3 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port, it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Nov.* 8.

The volume of business is improving gradually, but quotations continue easy for most products. With the reduced production of light oils at this season stocks are being depleted.*

Pitch.—Few orders are being placed, and price is nominal at about 45s. per ton f.o.b. Glasgow. Home value is 45s. per ton *ex* works in bulk.

Refined tar to Ministry of Transport Specification is in poor call for prompt delivery, and the forward position is easy. Quotations are lower at 2⅞d. to 3⅛d. per gallon f.o.r. makers' works.

Creosote.—While prices remain unchanged, stocks are being absorbed gradually. B.E.S.A. Specification is 2⅞d. to 3¼d. per gallon; low gravity, 3d. to 3⅛d. per gallon; and neutral oil, 3d. to 3¼d. per gallon—all f.o.r. works in bulk quantities.

Cresylic.—Prices are a fraction lower. Pale, 97/99 p.ct., is 1s. 6½d. to 1s. 7½d. per gallon; dark, 97/99 p.ct., 1s. 5½d. to 1s. 6½d. per gallon; and pale, 99/100 p.ct., 1s. 8½d. to 1s. 9½d. per gallon—all f.o.r. works in buyers' packages.

Crude naphtha.—Available supplies command 4d. to 4½d. per gallon free on rails.

Solvent naphtha.—The market is quiet with prices easy; 90/160 being 1s. 2½d. to 1s. 3d. per gallon, and 90/160 about 1s. to 1s. 0½d. per gallon.

Motor benzole.—There is no improvement in this area, and value is about 1s. 4½d. to 1s. 5d. per gallon.

Pyridines remain nominal. 90/160 is 3s. to 3s. 3d. per gallon.

* This refers particularly to Scotland, where a number of the gas-works store their crude tar until the commencement of the road-tarring season—about March/April.

Benzole Prices.

The following are considered to be the market prices at the present time:

	s. d.	s. d.	
Crude benzole . . .	0 8	to 0 9	per gallon at works
Motor ,, . . .	1 3½	,, 1 4½	,, ,, ,,
Pure ,, . . .	1 8	,, 1 9	,, ,, ,,

Trade Notes.

"Danks-Netherton" Jacketed Fans.

Messrs. H. & T. Danks (Netherton), Ltd., have published a booklet dealing with steam and other jacketed pans. The firm handle every kind of pan used, for all pressures and of any capacity. They incorporate special fittings of every known type, and they fabricate in every known useful metal or alloy. In the booklet they have illustrated the more generally useful types of pan in such a way that those who require equipment of this nature may have no difficulty in determining the type and size most suitable for their purpose. When corrosion or any other destructive influence is present, special materials are incorporated in the design. The materials of construction include bronze, enamelled iron, high tensile steel, brass, aluminium, nickel, stainless steel and iron, silicon iron, monel metal, copper, ingot iron, and hard lead.

Newton, Chambers, & Co., Ltd.

This firm have purchased the goodwill, designs, specialities, and patterns of the Engineering Department of Messrs. Dewhursts Engineering Company, Ltd., Vulcan Works, Sheffield. The specialities of the latter firm—viz., hot metal cars and ladles, slag cars and ladles, hydraulic operating valves, charging boxes, and other steelwork equipment—have achieved a world-wide reputation, and it is the intention of Messrs. Newton, Chambers to maintain this high-class standard, in both design and workmanship, in the manufacture of these products. The firm have excellent modern facilities for carrying out this class of work and have their own resources, embracing collieries, coke ovens, iron ore mines, limestone quarries, and blast furnaces, in addition to foundries and engineering and steel constructional shops. Messrs. Newton, Chambers have also secured the services of Messrs. Dewhursts Engineering Company's Technical Director, Mr. Lees, and their staff, and are thus in a favourable position to give a continuity of service in regard to both additional plant and replacements.

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Nov. 7.	Rise or Fall on Week.	Transact'ns Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
171,978	Stk.	Aug. 14	5	5	Aldershot 5 p.c. max. C. .	73—78	..	75
522,992	,,	,,	4	4	Do. 4 p.c. Pref. . .	72—76	+3	..
1,551,868	,,	Oct. 9	7½	7½	Alliance & Dublin Ord. . .	94—97	+1	95½—96½
374,000	,,	July 10	4	4	Do. 4 p.c. Deb. . . .	64—67	+1	..
522,655	,,	Aug. 28	7	7	Barnet Ord. 7 p.c. . . .	107—110	..	108—110
300,000	1	Oct. 23	1/4½	1/7½	Bombay, Ltd.	15/6-17/6	..	..
174,500	10	Aug. 14	9	9	Bournemouth 5 p.c. . . .	14—15	..	..
500,050	10	,,	7	7	Do. B 7 p.c. . .	12½—12⅝	..	12¾—12⅝
439,160	10	,,	6	6	Do. Pref. 6 p.c. .	11—11½	..	..
50,000	Stk.	June 26	3	3	Do. 3 p.c. Deb. .	58—61	+1	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb. .	77—80	+2	..
357,900	,,	Aug. 28	7½	7½	Brighton & Hove 6 p.c. Con.	112 117	..	..
371,880	,,	,,	6½	6½	Do. 5 p.c. Con.	101—104	..	..
1,287,500	,,	July 24	5	5	Bristol 5 p.c. max.	92½-93½a	+1	..
855,000	,,	Sept. 25	8	7	British Ord.	108-113	..	111—112½
100,000	,,	June 26	7	7	Do. 7 p.c. Pref. . . .	112—117	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. . .	75—78	+3	74½—77
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. . .	97—100	+2	..
100,000	,,	June 26	5	5	Cambridge 5 p.c. Deb. . .	97—100	+2	..
100,000	10	May 22	6	10	Cape Town, Ltd.	9—10	..	..
100,000	10	Nov. 6	4½	4½	British Ord.	6¼—7¼*	..	..
150,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb. . .	71—76	..	..
626,860	,,	July 24	6	6	Cardiff Con. Ord.	95—98	..	..
287,860	,,	June 26	7½	7½	Do. 7½ p.c. Red. Deb. .	99—102	+1	..
157,150	,,	Aug. 14	6½	5	Chester 5 p.c. Ord. . . .	86—91b	..	..
98,986	1	Oct. 9	1/2/-	1/2/-	Colombo, Ltd. Ord. . . .	33/—34/-	..	..
24,500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. .	18/—20/-	..	18/3
609,304	1	Oct. 9	1/3⅜	1/4⅜	Colonial Gas Assn. Ld. Ord	16/6—18/6	..	..
295,053	1	,,	1/7½	1/9½	Do. 8 p.c. Pref.	18/—20/-	..	..
2,078,280	Stk.	July 24	7	6	Commercial Ord.	94—97	..	95½—96
475,000	,,	June 26	3	3	Croydon sliding scale . .	58—61	+1	..
787,560	,,	Aug. 14	7	7	Do. max. div. . . .	105—108	+1	106—108
453,100	,,	,,	5	5	Derby Con.	81—84	..	83—83⅜
642,270	,,	Aug. 14	10	7	Do. Deb.	115—125a	..	..
55,000	,,	June 26	4	4	East Hull Ord. 5 p.c. . .	65—70a	..	..
209,000	,,	Aug. 28	5	5	European, Ltd.	69—71	..	..
1,002,180	,,	Sept. 25	†7g	†4	Gas Light & Coke 4 p.c. Ord.	100—110	−3	100—108
18,829,125	,,	July 24	5½	5½	Do. 3½ p.c. max. . . .	19/6—20/-f	..	19/4½ - 19/9
2,600,000	,,	,,	3½	3½	Do. 4 p.c. Con. Pref. . .	63—65	..	64½
4,157,020	,,	,,	4	4	Do. 3 p.c. Con. Deb. . .	78—81	..	80 - 81
5,602,620	,,	June 26	3	3	Do. 5 p.c. Red. Deb. . .	60—63	..	62
3,642,770	,,	,,	5	5	Harrogate Cons. 10 p.c. max.	100—103	..	..
161,480	,,	Sept. 11	10	10	Hastings & St. L. 5 p.c. Conv.	155—160	..	..
82,500	,,	Aug. 28	7	7	Do. 3½p.c. Conv.	97—102	..	99½—101½
268,740	,,	,,	5½	5½	Hongkong & China, Ltd. .	76—81	..	..
70,000	10	Oct. 9	½	10	Hornsey Con. 3½ p.c. . . .	13—14	..	..
213,200	Stk.	Aug. 14	6	6	Imperial Continental Cap. .	88—91	..	..
2,436,594	,,	Nov. 6	25	15	Do. 3½ p.c. Red. Deb.	845—865*	..	846—861
228,130	,,	Aug. 14	3½	3½	Lea Bridge 5 p.c. Ord. . .	80—85	..	..
235,242	,,	Aug. 14	8½	8½	Liverpool 5 p.c. Ord. . .	123—128	..	..
2,145,907	,,	Aug. 14	6	6	Do. 7 p.c. Red. Pref. .	95½—96½b	+½	..
600,000	,,	Sept. 25	7	7	Maidstone 5 p.c. Cap. . .	120—125	..	..
165,736	,,	Aug. 28	8	9	Do. 3 p.c. Deb. . .	55—58	+4	..
63,480	,,	June 26	3	3	Malta & Mediterranean . .	5½—6	..	..
75,000	5	June 26	†10	†10	Metrop'itan (of Melbourne)			
392,000	—	Oct. 1	5½	5½	5½ p.c. Red. Deb. . . .	88—91	..	..
675,000	Stk.	May 22	†6	†8	Montevideo, Ltd.	100—110	..	..
2,061,315	,,	July 24	5½	5	Newcastle & Gateshead Con.	16/—16/9d	−/1½	..
682,856	,,	,,	4	4	Do. 4 p.c. Pref. .	71½—72¾d	..	..
691,705	,,	June 26	3½	3½	Do. 3½ p.c. Deb. .	67½—68¼d	..	..
169,940	,,	Aug. 28	7½	7½	North Middlesex 6 p.c. Con.	106—111	..	..
396,160	,,	Aug. 14	5	5	Northampton 5 p.c. max. .	76—81	..	..
300,000	,,	Apl. 24	9	7	Oriental, Ltd.	108—113	..	..
60,000	5	18 My., '15	—	—	Ottoman	0—½	..	..
205,162	Stk.	June 26	8	8	Plym'th & Stonehouse 5 p.c.	110 - 115	..	..
424,416	,,	Aug. 28	8	8	Portsm'th Con. Stk. 4 p.c. Std	107—112	..	..
241,446	,,	,,	5	5	Do. 5 p.c. max. . .	77—80	..	..
186,000	100	June 2	4	4	Primitiva 4 p.c. Red. Deb. .	96—99	..	..
677,837	Stk.	July 24	4	4	Do. 4 p.c. Red. Deb. 1911	83—86	..	..
371,496	,,	June 26	4	4	Do. 4 p.c. Cons. Deb. .	83—86	..	..
150,000	10	Sept. 25	6	6	San Paulo 6 p.c. Pref. . .	8½—8¾	..	..
1,736,968	Stk.	Aug. 28	6½	6½	Sheffield Cons.	104—106e	..	..
95,000	,,	July 10	4	4	Do. 4 p.c. Deb. . . .	76—78e	..	..
90.000	10	June 5	†4	†5	South African	4—6	..	..
6,709,895	Stk.	Aug. 14	7½	5	South Met. Ord.	103—105	..	103—104½
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	110—113	..	..
1,895,445	,,	July 10	3	3	Do. 3 p.c. Deb. . .	60—63	..	62
734,000	,,	Sept. 11	6½	6½	Do. 6½ p.c. Red. Db.	99—102	..	..
91,500	,,	Aug. 14	8½	8½	South Shields Con. . . .	105—107d	..	..
1,643,795	,,	July 24	6½	6½	South Suburban Ord. 5 p.c.	102—105	+2	102½—104
468,837	,,	June 26	5	5	Do. 5 p.c. Deb.	97—100	+2	..
647,740	,,	Aug. 28	5	5	Southampton Ord. 5 p.c. max.	75—78	..	..
121,275	,,	June 26	4	4	Do. 4 p.c. Deb.	76—78	+3	..
179,014	,,	July 24	8	8	Sutton Ord.	115—120	..	..
94,500	,,	June 26	5	5	Do. 5 p.c. Deb. . . .	96—99	+3	..
250,000	,,	Aug. 28	7	7	Swansea 7 p.c. Red. Pref. .	98—101	..	..
200,000	,,	June 26	6½	6½	Do. 6½ p.c. Red. Deb. .	102—105	..	..
1,076,490	,,	July 24	6⅝	6⅝	Tottenham District Ord. .	102—106	..	104
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. . .	95—98	..	..
199,005	,,	June 26	4	4	Do. 4 p.c. Deb. . .	77—80	+2	..
182,380	10	30 Dec., '12	—	—	Tuscan, Ltd.	2—3	..	..
85,701	Stk.	Sept. 25	6	6	Do. 6 p.c. Red. Deb.	73—78	..	..
309,094	,,	Aug. 28	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	95—100	..	..
88,330	,,	,,	5	5	Do. 5 p.c. pref. . .	88—93	+3	88
1,180,970	,,	July 10	—	7	Wandsworth, Wimbledon, and Epsom Cons. . .	108—113	+1	109—111
200,000	,,	,,	5	5	Do. 5 p.c. Pref.	91—94	..	..
488,344	,,	June 26	5	5	Do. 5 p.c. Deb.	99—102	+1	101

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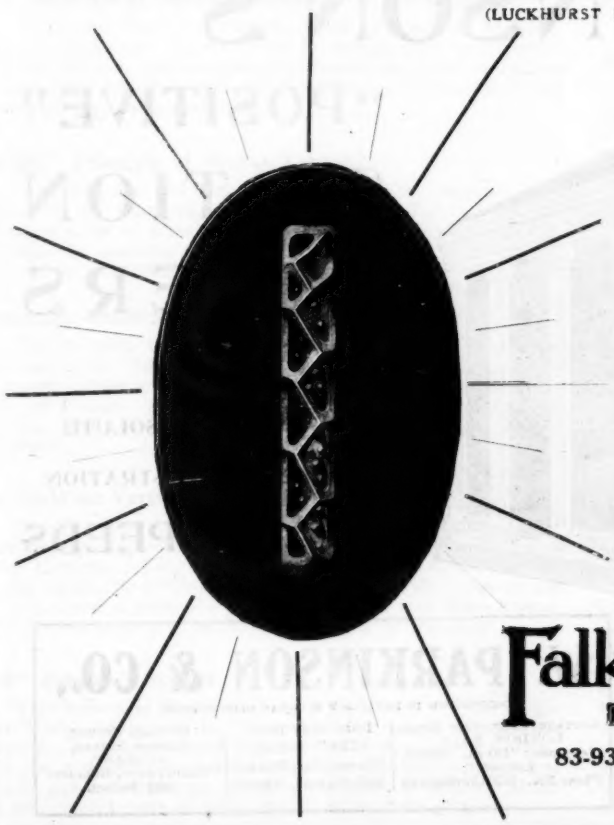

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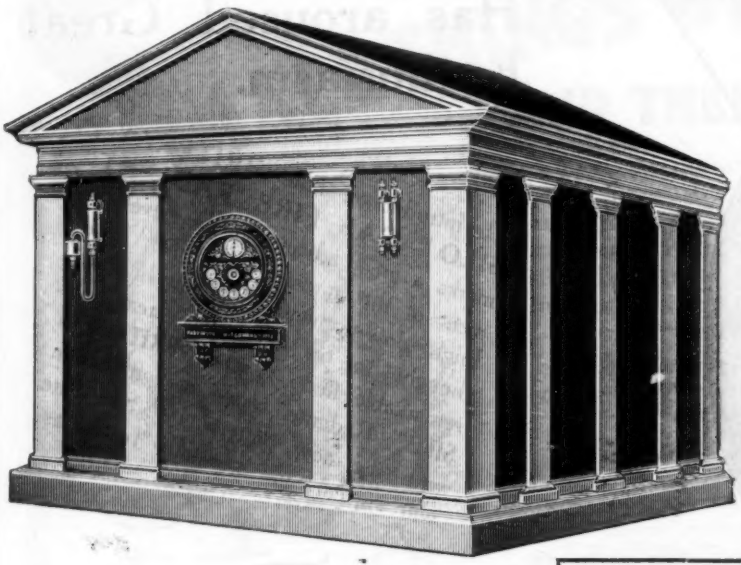

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